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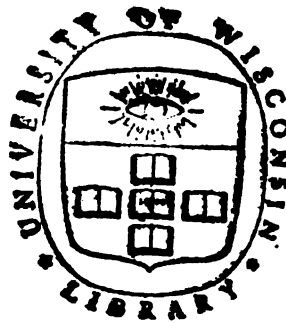


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**VOL. VIII.**  
**FUGGER-HAYNAU.**





THE NEW  
" **AMERICAN CYCLOPÆDIA:**

A  
**Popular Dictionary**  
OF  
**GENERAL KNOWLEDGE.**

EDITED BY  
**GEORGE RIPLEY AND CHARLES A. DANA.**

**VOLUME VIII**  
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# THE NEW AMERICAN CYCLOPÆDIA.

## FUGGER

**FUGGER**, the name of a German family of wealthy merchants. Its founder was **JOHANNES**, a weaver of Graben, near Augsburg, who lived in the first half of the 14th century, and acquired a large property in lands by commerce in cloths. His son, of the same name, continued the occupation of weaver, to which he also added that of cloth merchant, and obtained by marriage the right of citizenship in Augsburg. **ANDREAS**, eldest son of the latter, lived about 1400, and was known as "Fugger the Rich." The nephews of the last, **ULRICH**, **GEORG**, and **JAKOB**, born about the middle of the 15th century, covered the Baltic with their commerce, which extended also to Hungary, Italy, and even to India, were able to influence the affairs of the empire by lending money to the princes, married into the most illustrious families, and were ennobled by the emperor Maximilian I. After attaining to high political dignities, they continued their commerce, built in the Tyrol the splendid castle of Fuggeran, greatly embellished the city of Augsburg, and found a new source of wealth by working the mines of Innthal, Falkenstein, and Schwartz. The only heirs of these 3 brothers were the 2 sons of Ulrich, **RAMUND**, born in 1489, died in 1535, and **ANRON**, born in 1498, died in 1540. The former of these patronized letters and the sciences, and was saluted in many poor poems as the Mæcenas of his times. The latter raised the family to its highest degree of power and prosperity. The emperor Charles V. resorted to them both when pressed for money, yielded to them the privilege of coining, made them counts and princes of the empire, and was lodged in the splendid mansion of Anton when he attended the diet of Augsburg. They established at Augsburg a cabinet of antiquities, a gallery of paintings, and a botanical garden, built the church of Saint Maurice, paid 8,000 crowns to Titian for a few paintings, and collected the 2 largest libraries that had yet been seen in Germany. Their name was given to a street in Madrid, and "as rich as a Fugger" became a proverb. Upon the death of these 2 brothers the family divided into numerous lines, and its most important branches at present are the princely houses of Kirchberg and Babenhausen.

**FUGITIVE**, literally, one who flies away.

## FUGITIVE

At common law there was the fugitive from justice; and the name of fugitive was also given sometimes to a person escaping from arrest or imprisonment for debt or from apprenticeship; and in the feudal law an escaping serf or bondsmen was regarded as a fugitive. In the United States the name is commonly given to one who, in the words of the federal constitution, is "held to service or labor in one state under the laws thereof," and "escapes into another;" that is, a fugitive slave. A fugitive from justice is more exactly defined as one who, having committed a crime within one jurisdiction, escapes from punishment by fleeing into another. The law of nations certainly does not permit the sovereignty from which the fugitive has escaped to enter, *proprio vigore*, into the country where he has taken refuge, and seizing him there, take him home for punishment. Of this there is no question whatever. But it has been much discussed whether the law of nations requires the arrest of the fugitive in the territory to which he flies by the authorities thereof, and the delivering or extradition of him to the authorities from whom he has fled. The weight of authority is, perhaps, against any such obligation or duty in the absence of treaty stipulations. But such treaties have been frequently made of late years, and are justly regarded as the effect and indication of advancing civilization. The American government has made treaties providing for the extradition of fugitives from justice with England, France, Bavaria, Prussia, Hanover, and other states of the German confederation. These treaties usually specify the crimes which fugitives must be accused of to be delivered up; and also provide that no country shall be required to deliver its own citizens or subjects to a foreign country for trial and punishment.—As between the states of the American Union, extradition is made compulsory by the federal constitution, art. iv., sec. 2, which provides that "a person charged in any state with treason, felony, or other crime, who shall flee from justice, and be found in another state, shall, on demand of the executive authority of the same state from which he fled, be delivered up to be removed to the state having jurisdiction of the crime." In the several states there

are statutory provisions or established usages regulating the procedure in such cases. They vary in some respects, but the process is substantially as follows everywhere: 1. The alleged fugitive is charged with the crime in the state from which he flies, and sufficient evidence of his probable guilt is offered to the executive. 2. That executive gives to the applicant a formal requisition (reciting generally the facts of the case) upon the executive of the state to which he has fled. 3. This last executive then examines into the case, usually by the prosecuting officer of the state, as far as he deems necessary, and if he sees no sufficient reason to the contrary, issues his warrant to some proper officer. 4. Thereupon this officer takes possession of the fugitive, and is protected in carrying him to the state from which the requisition issues, and there surrendering him to the proper officer. 5. It has been held that if the executive which issues the warrant becomes satisfied that it should not have been issued, it may withdraw it and liberate the fugitive at any time before he passes beyond the limits of the state. The extradition of the fugitive from service is provided for, not by state statutes, but by acts of congress. They provide very summary processes, as entirely ministerial and as little judicial as such processes can be, in the state to which the fugitive slave has fled, resting the whole procedure upon a previous judicial investigation at home, which has been held to be conclusive as to the service due and the escape, and to leave for trial in the foreign state only the question of personal identity. If the fugitive slave be surrendered to the claimant, and if the claimant takes him home, he may there have all the opportunity which the general law gives him of trying the question whether he is bound to service. This statute and process have been held to be applicable to fugitive apprentices.

**FUGUE** (Lat. *fuga*, flight), a species of musical composition in which one voice or part seems to be perpetually flying away from another, whence the name. The principal musical thought of the piece, or the subject, having been performed by one voice or part, is taken up by another, and so on with all the voices or parts, each commencing after the others, and all performing together. The result is an endless pursuit and flight of the same theme by the different parts. Fugues are simple, double, or counter, the latter being much the most complicated, and afford a wide field for invention, of which the older composers frequently took advantage.

**FULDA**, a S. E. province of Hesse-Cassel, bounded E., S., and W. by Weimar, Bavaria, and Hesse-Darmstadt; area, 860 sq. m.; pop. in 1854, 138,685.—**FULDA**, the capital of the province, is situated on a river of the same name, here crossed by 3 bridges, 56 m. N. E. from Frankfort-on-the-Main; pop. 9,570. It contains an electoral palace and gardens, formerly the residence of the prince-bishops, 11 churches, 2 convents, an ecclesiastical seminary, and a num-

ber of schools. The cathedral is a fine modern building, the 4th which has stood on this site. Of the ancient church it retains only a crypt, in which is the sarcophagus of St. Boniface. Fulda has also a library of 50,000 volumes, manufactories of cotton, linen, and woollen goods, &c., and trade in corn and cattle.

**FULGURITE** (Lat. *fulgur*, lightning), sand vitrified into a slender tube, which is sometimes of great length, found on sandy beaches and plains, penetrating in some instances 50 feet or more beneath the surface, and dividing into several branches. Beudant describes fulgurites under the mineral species quartz, by the name of *quartz tubuleux*, and ascribes their origin to a stroke of lightning. Their diameter varies from  $\frac{1}{8}$  of an inch to  $8\frac{1}{2}$  inches, and the thickness of the wall of the tube from  $\frac{1}{16}$  of an inch to 1 inch. Their inner surface is vitrified; the outer is composed of grains of sand cemented together. M. Fiedler exhibited one to the French academy of sciences in 1843, which he excavated from a point in a vineyard which had just been struck by lightning. Dufrenoy (*Mineralogie*, vol. ii., p. 161) speaks of one he saw in possession of M. Fictet, which was more than 10 metres long, and presented beside many ramifications. An account of a remarkable one dug up at Rome, N. Y., was published in the "American Journal of Science" (vol. xiv. p. 220, 1848). M. Hachette, together with Messrs. Savart and Beudant, succeeded in producing some artificially, making use of a strong electrical battery, and causing the charge to pass through a quantity of pounded glass placed in a hole in a brick. One was an inch in length, and from  $\frac{1}{8}$  to  $\frac{1}{4}$  of an inch in diameter outside—inside only  $\frac{1}{16}$  of an inch. With a little chloride of sodium mixed with the glass, a tube was obtained of uniform diameter  $1\frac{1}{2}$  inches long.

**FULLER**, ANDREW, an English Baptist theologian, born in Wicken, Cambridgeshire, Feb. 6, 1754, died in Kettering, Northamptonshire, May 7, 1815. Till the age of 20 he was chiefly engaged in husbandry; but having united himself to the Baptist church he became a preacher of that denomination, and was settled first at Soham in 1775, and afterward at Kettering in 1788. In 1784 he published a treatise entitled "The Gospel Worthy of all Acceptation," a work of great ability, which excited much controversy, and is believed to have materially modified the prevailing doctrinal views of the denomination to which he belonged. In 1799 he composed his "Dialogues and Letters" (published collectively in 1806). In 1792 he took an active part with Carey and others in establishing the Baptist missionary society, and was appointed its first secretary; and from that time till the close of his life he was constantly engaged in the most important and arduous labors for its prosperity, and the extension and success of its missions. In 1794 he published "The Calvinistic and Socinian Systems, examined and compared as to their Moral Tendency," in reply to which Dr. Joshua Toulmin wrote "The

**Practical Efficacy of the Unitarian Doctrine considered,**" and Fuller rejoined in "Socinianism Indefensible, on the ground of its Moral Tendency" (1797). He was the author of a great number of other treatises, sermons, &c., all of which bear the marks of an acute and powerful mind. His "Complete Works" were published in 8 vols. 8vo. (London, 1824), and in 1 vol. imperial 8vo., with a memoir by his son (1852). They have been reprinted in the United States with a memoir by the Rev. Joseph Belcher (8 vols. 8vo., Philadelphia), and in other editions. The degree of D.D. was conferred on Mr. Fuller by Yale college, and also by the college of New Jersey, but he declined receiving it as unscriptural and incompatible with the simplicity of the Christian character. From his sagacity and strong common sense, his almost instinctive knowledge of the human heart, and the native vigor and practical character of his mind, he has been called "the Franklin of theology."

**FULLER, MARGARET.** See **OSSOLI, MARGARET FULLER.**

**FULLER, RICHARD, D.D.**, an American clergyman, born in Beaufort, S. C., in 1808. He was graduated at Harvard college in 1824, subsequently studied law, and before his 21st year was admitted to the bar of South Carolina. He almost immediately entered upon a large and lucrative practice, and was on the road to professional eminence when he was prostrated by a fit of sickness. On his recovery he became a member of the Episcopal church, afterward joined the Baptist denomination, and, renouncing his profession, studied for the ministry. He was ordained in 1833, and took charge of the Beaufort Baptist church, where his preaching and pastoral offices were attended with beneficial results. In 1847 he assumed the charge of the 7th Baptist church in Baltimore, one of the largest in the city, with which he still remains connected. Among Dr. Fuller's published writings are: "Correspondence with Bishop England concerning the Roman Chancery;" "Correspondence with Dr. Wayland on Domestic Slavery;" "Sermons," and "Letters."

**FULLER, THOMAS**, one of the wittiest and most peculiar and original of English authors, born in Aldwinckle, Northamptonshire, in June, 1608, died Aug. 15, 1661. He was carefully educated by his father, the rector of St. Peter's in his native village, till in his 18th year he was sent to Queen's college, Cambridge. He won the highest university honors, and received the degree of bachelor in 1625, of master in 1628, a fellowship in Sidney Sussex college in 1631, and about the same time the living of St. Bonet's, Cambridge, where he exhibited great eloquence as a preacher. He was also made a prebendary of Salisbury. His first publication was a poem entitled "David's heinous Sinne, heartie Repentance, heavey Punishment" (London, 1631). He was soon after presented to the rectory of Broad Windsor, Dorsetshire, where he prosecuted several

works that he had planned at Cambridge. After 7 years he removed to London, where his fame for pulpit eloquence secured for him the lectureship of the Savoy, and he published his "Historie of the Holy Warre" (Cambridge, 1639; 5th ed., 1651), which greatly extended his reputation. In 1640 he was member of the convocation assembled in Henry VII.'s chapel, Westminster, to make canons for the better government of the church, and has given an interesting account of its proceedings in his "Church History." On the outbreak of the civil war he remained in London after the departure of the king, laboring to mitigate the violent feelings that were dividing the people into two hostile parties; and in 1643, on the anniversary of the accession of Charles, he preached a sermon in Westminster abbey of so loyal a spirit as to give great offence to the parliamentarians. He soon after declined taking the oath to parliament, and joined the king at Oxford, who was curious concerning his extraordinary abilities, and immediately invited him to preach before him; but his calm moderation pleased the royalists as little as it did their opponents. He resided at Oxford in Lincoln college, but sentence of sequestration was pronounced against him, and he lost his books and manuscripts. Two royalist noblemen gave him the remains of their private libraries that had escaped the ravages of war, and he at length identified himself with the royal cause by seeking a chaplaincy in the army under Sir Ralph Hopton. He improved the leisure which this position gave him, and the facilities presented by the marches and countermarches through the country, in collecting by an extensive correspondence and personal inquiries the materials for his "Worthies of England." He was besieged at Basing House in 1644 with a small party of royalists, but animated the garrison to so vigorous a defence that the parliamentary commander was obliged to retire with considerable loss. Taking refuge in Exeter on the defeat of Hopton in 1645, he preached constantly to the citizens till its surrender in April, 1646, and published there his "Good Thoughts in Bad Times" (1645). His "Good Thoughts in Worse Times" appeared in 1646, after his return to London, and he published a new edition with the "Second Century of Good Thoughts in Bad Times" (1647); in 1660 he completed the series with "Mixt Contemplations in Better Times." He continued to preach and to publish tracts and sermons, notwithstanding "it had been the pleasure of the present authority to make him mute," and notwithstanding Cromwell's prohibition of all persons from preaching or teaching schools who had been adherents of the late king. In 1648 he became rector of Waltham abbey in Essex, and in 1658 chaplain to Lord Berkeley and rector of Cranford. Shortly before the restoration he was reinstated in his lectureship at the Savoy, and after that event was chosen chaplain extraordinary to the king, and regained the prebend of Salisbury. A

bishopric was expected for him, when he met his death by a fever. He was buried in his church at Cranford, in the chancel of which his monument still remains. His "Holy and Profane State, a collection of Characters, Moral Essays, and Lives, Ancient, Foreign, and Domestic" (Cambridge, 1642; 4th ed. 1668), proposing examples for our imitation and abhorrence, is one of his best productions, and fully exhibits his sagacity of thought and pithiness of style. His "Church History of Britain, from the Birth of Jesus Christ until the year MDCXLVIII." (London, 1655), though abounding in jokes, quibbles, dedications, anecdotes, and curious and irrelevant learning, is one of the most remarkable works in the language for wit, piety, pathos, and imagination, and contains many interesting memorials, the result of long, active, and extended research. The "History of the Worthies of England," a collection of eccentric biographies, published posthumously (London, 1662), has been more generally read than any other of his works, and abounds in gossip, admirably told stories, curious details, and witty and excellent reflections. The men whose lives are recorded are arranged according to their native counties, of which he mentions the natural productions, herbs, medicinal waters, curiosities, local proverbs, manufactures, and buildings. Of his minor productions, the principal are the "Appeal of Injured Innocence" (London, 1659), a defence of his "Church History" (with which it is sometimes bound) against Heylin, and treating almost every subject within the range of human disquisition; the "Pisgah-Sight of Palestine" (London, 1650); and "Andronicus, or the Unfortunate Politician" (London, 1646). The style of all his writings is extremely quaint and idiomatic, in short and simple sentences, and singularly free from the learned pedantry of his time. "Next to Shakespeare," says Coleridge, "I am not certain whether Thomas Fuller, beyond all other writers, does not excite in me the sense and emulation of the marvellous; the degree in which any given faculty, or combination of faculties, is possessed and manifested, so far surpassing what we would have thought possible in a single mind, as to give one's admiration the flavor and quality of wonder. Fuller was incomparably the most sensible, the least prejudiced great man, in an age that boasted of a galaxy of great men. In all his numerous volumes on so many different subjects, it is scarcely too much to say that you will hardly find a page in which some one sentence out of every three does not deserve to be quoted by itself as a motto or as a maxim." His memory was so remarkable, that he could repeat a sermon verbatim after hearing it once, and 500 unrelated words of different languages after hearing them twice. His lively and learned conversation made his company much courted, and he would listen for hours to the prattle of old women in order to catch snatches of local history and tradition and proverbial wisdom.

FULLERS' EARTH, an unctuous sort of clay,

useful in fulling cloth, from its property, common to aluminous earths, of absorbing oil and grease. That variety of clay is preferred which falls to pieces when put in water, making a slight crackling sound. Its colors are various shades of yellowish, greenish, bluish, brown, and gray; lustre dull, but appears greasy when rubbed. Composition as given by Dr. Ure: silica 53, alumina 10, peroxide of iron 9.75, magnesia 1.25, lime 0.5, water 24, potash a trace. Dr. Thomson found silica 44, alumina 23.06, protoxide of iron 2, magnesia 2, lime 4.08, water 24.95. It is not now esteemed of so much value as formerly, soap having taken its place. In England it used to be so highly valued that its exportation was prohibited. It was carried in large quantities from the counties of Surrey and Buckingham, and then sold to be transported to the north or west of England. When used, it was first dried by the sun or by fire, and then thrown into cold water. The powder thus formed was sorted by washing into coarse and fine qualities, the former of which were applied to inferior cloths, the latter to the finer goods.

FULLERTON, LADY GEORGINA CHARLOTTE, an English authoress, born Sept. 28, 1812. She is the daughter of the 1st earl of Granville, and was married in 1833 to Capt. Alexander George Fullerton. Her first publication, a novel entitled "Ellen Middleton," appeared in 1844, and was succeeded within a few years by "Grantley Manor." Both works exhibit constructive skill and an analysis of character of no mean order. "Lady Bird," published in 1852, after the conversion of the authoress to the Roman Catholic church, is one of her most imaginative works.

FULLING, also called MILLING, the operation of removing greasy matters from woollen goods, and of giving to them a more compact texture by causing the fibres to entangle themselves more closely together, as in the process of felting. Fulling mills are ancient inventions, the process probably having been applied to the first woven fabrics, as felting must already have been then known. Cloths brought to the fulling mills contain the oil which was applied to the fibre in weaving. The first process to which they are subjected is called scouring or braying. This is effected by placing the rolls in troughs so arranged that they can retain the detergent liquid, as, first, stale urine and hogs' dung, subsequently urine alone, and again fullers' earth and water, while heavy oaken mallets or pounders slide down with force into one end of the troughs and mash and roll over the folds of cloth. The pounders are lifted by revolving cams, and kept in action for hours together, one to each trough. The oil is absorbed by the clay, and both are washed off by the water. The fulling is properly a second process performed in the same machines with the use of soap applied liberally in solution. The stampers are better made of polished iron, and the operation is facilitated with economy of soap by keeping the trough filled with hot steam. Cloth is also fulling in what is called the fulling machine with-

out stamping, the cloth being pushed in a succession of folds through a low trough, the top of which is made by weights to press upon these folds and resist their progress through. The soap is washed out after the fulling, and the nap is raised by teasing. To properly full a piece of ordinary broadcloth it has been customary to allow from 60 to 65 hours, and 11 lbs. of soap; the shrinkage in width is from 12 quarters to 7, and in length from 54 yards to 40. A piece of Venetian broadcloth 54 yards shrank to 45 yards in length, and from 7 quarters 8 nails to 6 quarters 2 nails in width, and required 12 hours and from 6 to 7 lbs. of soap.

FULMINATES (Lat. *fulmen*, a thunderbolt), salts of fulminic acid and some base, as gold, platinum, silver, and mercury, all of which possess the property of exploding with more or less violence. The last two only are applied to any practical purpose. Fulminating mercury (represented by the formula  $2\text{Hg O, Cy, O}_2$ ) is the compound used in the manufacture of percussion caps. It is prepared, as recommended by Dr. Ure, by dissolving at a moderate heat 1 ounce weight of mercury in  $7\frac{1}{2}$  fluid ounces of nitric acid of specific gravity 1.4, turning this into 10 fluid ounces of alcohol of specific gravity .83, the temperature of the acid and mercury being about  $180^\circ \text{F}$ . It is well to employ for dissolving the mercury a glass retort furnished with a receiver of glass, which is kept cool by a current of water. The acid vapors which are condensed in this should be returned to the retort. When the mercury is dissolved, the solution should be slowly introduced into the matrass containing the alcohol, the capacity of which should be at least 6 times that of the liquids. Bubbles of gas soon begin to escape from the bottom of the mixture, and the whole is soon thrown into a rapidly bubbling condition. It becomes frothy and white; highly combustible vapors escape, which should be allowed to pass off into the air without coming in contact with flame or any heated surface. These vapors consist of various products of the oxidation of the alcohol, as aldehyde, acetic acid, formic acid, and nitrous, acetic, and formic ethers. They may be condensed and converted to use in other operations; but any obstruction thus presented to their free escape is regarded as injuriously affecting the main object of the operation. A considerable quantity of them were condensed by Mr. Samuel Guthrie of Sackett's Harbor, N. Y., whose experiments will be noticed hereafter. The effervescence ceasing, the contents of the matrass are turned upon a double filter of paper, and thoroughly washed with pure cold water, till the washings cease to reddan litmus paper. When quite drained, the filter is removed from the funnel, and spread open with its contents upon a plate of copper or stone ware, raised by steam or hot water to the temperature of  $212^\circ \text{F}$ . It is thus dried, and may then be put away in paper parcels of 100 grains each, which are to be kept protected from moisture. The salt when well prepared is

in small sparkling crystals of brownish gray color, which moistened with water upon a slip of paper appear transparent. They dissolve in 180 times their weight of boiling water, leaving no residuum if pure. As the water cools, the fulminate reappears in pearly spangles. Fulminate of mercury explodes at a heat somewhat below  $870^\circ \text{F}$ , or by being struck smartly between two hard metallic surfaces. Rubbing it between two wooden surfaces will produce the same effect. When moistened with 5 per cent. of water, the portion struck may explode without communicating the effect to the portions in contact. Fulminate of mercury may be fired in contact with gunpowder without igniting this, even when covered loosely with it; but when the powder is packed in a tube and the fulminate in a percussion cap is exploded in contact with it, the gunpowder is more instantaneously ignited throughout than by any other mode of firing. The projectile effect of 10 parts as formerly fired is thus obtained from  $8\frac{1}{2}$  parts.—In the manufacture of percussion caps the French use 1 kilogramme of mercury to produce  $1\frac{1}{2}$  kilogrammes of fulminate, which is sufficient for 40,000 caps. They grind the mercurial salt with 80 per cent. of water upon a marble table with a wooden muller, mixing 6 parts of gunpowder with 10 of fulminate. This when dried forms the composition which is introduced into the caps—about 1 grain to 4 caps. Dr. Ure recommends a solution of mastic in spirits of turpentine as the fittest medium for attaching the fulminate to the bottoms of the caps. Instead of using the fulminate alone, or with gunpowder, as practised by the French, the English mix with every 3 parts of it 5 parts of chlorate of potash, 1 part of sulphur, and 1 of powdered glass. Nitre is also recommended in the proportion of  $\frac{1}{3}$  of the fulminate, mixed with it when it contains 20 per cent. of water. Mr. Samuel Guthrie of Sackett's Harbor, N. Y., who performed a series of practical experiments on a large scale upon these compounds, found that a most efficient preparation was made by mixing 1 part of oxide of tin with 3 parts of fulminating mercury, and grinding them together with a stiff solution of starch. The starch gave cohesiveness to the grain without injuring its explosive qualities. Mr. Guthrie's experiments are recorded in the "American Journal of Science" for Jan. 1882. They are highly interesting for their practical character and applications, and the extreme hazard which attended them. It was in the course of these experiments that Mr. Guthrie made the discovery of chloroform, also discovered about the same time in France and Germany. The original fulminating powder, patented by the Rev. Mr. Forsyth in 1807, consisted only of chlorate of potash, sulphur, and charcoal. In the manufacture of percussion caps a drop of gum is introduced into the bottom of each one, and the fulminating powder is dropped in upon this. A coating of varnish is sometimes afterward applied to protect them from moisture. It was represented by an exhibitor at the Lon-



don exhibition in 1851, that 1,800,000,000 caps were manufactured yearly for sporting guns in Europe, which involved a consumption of 896,000 lbs. of copper.—Fulminating silver ( $2\text{Ag O}$ ,  $\text{Cy}_2 \text{O}_2$ ) is prepared like fulminating mercury, except that the mercury is replaced by fine silver, and the nitric acid solution is allowed to become cool before it is turned into the alcohol. Or it may be made by introducing finely pulverized nitrate of silver into concentrated alcohol contained in a matrass, and after shaking it well adding as much fuming nitric acid as there was alcohol. On boiling, the nitrate of silver is first dissolved, then decomposed, and a flocculent precipitate separates, which is formed of an agglomeration of little needles of fulminate of silver. When this ceases to form, water is added, and the mixture is filtered, the washing being continued till there is no further acid reaction. The precipitate is then cautiously dried. This compound is so extremely dangerous that its manufacture ought to be entirely abandoned. It is used only for explosive toys, which are made of little glass balls of the size of peas, into which the fulminate is introduced in a moist state and dried. They are enveloped in a bit of blotting paper, and when used are exploded by throwing them upon the ground. Mr. Guthrie mentions his having suffered severely from explosions in his experiments; and in 1882 Dr. Robert Haré was dangerously injured by the explosion of a quantity of the feathery fulminate, which was nearly enough to fill an ounce bottle. It ignited as he was in the act of pouring it out upon the face of a hammer, as he had frequently done before. The explosion could be accounted for only on the supposition that a particle of the powder might have been compressed between the neck of the vial and the face of the hammer. Three fingers of his right hand were broken, and his assistant and a pupil were also injured. An English chemist named Hennel is reported to have been not long since killed by the explosion of about half a pound of the fulminate. He was torn in pieces, and his limbs were thrown in different directions. It is recommended never to keep the fulminates in glass vials, but in pasteboard cases, covered loosely with a card. They have been known to explode spontaneously, from no other cause apparently than a jarring motion in the room crowding the particles more closely together. An interesting paper by Prof. William H. Ellet upon the compound of cyanogen, including the fulminating salts, may be found in the "American Journal of Science" for July, 1830.—A compound is described as fulminating powder, into the composition of which fulminic acid does not enter. It is a mixture of 3 parts of nitre, 2 of dry carbonate of potash, and 1 of sulphur, the materials to be ground together in a warm mortar. If placed on a shovel over a fire, the compound melts at a temperature of about  $330^\circ$  and violently explodes. Another similar explosive mixture consists of 1 part of yellow prussiate of potash, 2 of chlorate of potash,

and 1 of sugar well dried, the whole to be ground and then intimately mixed.

**FULMINIO ACID**, one of the isomeric modifications of cyanic acid, represented by the formula  $\text{Cy}_2 \text{O}_2$ ,  $2\text{HO}$ . Its compounds are distinguished for their explosive character, in which they differ from those of cyanic acid. All attempts to obtain it in an isolated condition have failed from its tendency to instantaneous decomposition with explosion.

**FULTON**, the name of counties in several of the United States. I. An E. co. of New York, drained by Sacandaga river and E. Canada creek; area, about 530 sq. m.; pop. in 1855, 23,284. The soil is fertile and the surface uneven, with several mountainous elevations. The productions in 1855 were 33,908 tons of hay, 11,145 bushels of wheat, 855,865 of oats, 155,738 of Indian corn, 182,964 of potatoes, and 840,897 lbs. of butter. There were 9 grist mills, 8 paper mills, 90 saw mills, 2 woollen factories, 25 tanneries, 1 brick yard, 5 lime factories, 2 newspaper offices, 109 school houses, and 39 churches. Assessed value of real estate in 1856, \$3,862,000. The N. Y. central railroad passes near the S. boundary of the county. Formed from Montgomery co. in 1838, and named in honor of Robert Fulton. Capital, Johnstown. II. A S. co. of Penn., bordering on Maryland, and drained by Conoloway and Licking creeks, tributaries of the Potomac; area, 380 sq. m.; pop. in 1850, 7,567. Its E. boundary is formed by Cove mountain; Siding hill lies on its W. frontier, and between the two are fertile valleys. The uplands produce timber, which forms one of the chief staples. Tan bark, hay, and grain are also exported. The productions in 1850 were 88,758 bushels of wheat, 50,885 of Indian corn, 49,075 of oats, 4,752 tons of hay, 100,260 lbs. of butter, and 18,094 of wool. There were 18 corn and flour mills, 5 saw mills, 3 wool-carding mills, 10 tanneries, 1 newspaper office, 20 churches, and 1,570 pupils attending public schools. The county was formed from Bedford co. in 1848. Capital, McConnellsburg. III. A N. co. of Ark., bordering on Missouri, and drained by the N. fork of White river; area, 860 sq. m.; pop. in 1854, 2,269, of whom 65 were slaves. It has a hilly surface and a good soil, suitable for grain and pasturage. The productions in 1854 were 52,071 bushels of Indian corn, 3,667 of wheat, 11,588 of oats, and 80 bales of cotton. Capital, Pilot Hill. IV. A S. W. co. of Ky., bounded S. by Tennessee, and separated from Missouri on the W. and N. W. by the Mississippi river; area, about 200 sq. m.; pop. in 1850, 4,446, of whom 943 were slaves. The surface is somewhat diversified, and the soil generally fertile. The principal exports are tobacco, grain, and live stock. The productions in 1850 were 236,315 bushels of Indian corn, 25,494 of oats, 222,482 lbs. of tobacco, and 4,209 of wool. There were 2 grist mills, 1 saw mill, 1 tannery, 1 newspaper office, 7 churches, and 278 pupils attending public and other schools. The county

is traversed by the Mobile and Ohio railroad. Capital, Hickman. Taken from Hickman co. in 1845. V. A N. W. co. of Ohio, bordering on Michigan, drained by Tiffin's river, a branch of the Maumee; area, about 337 sq. m.; pop. in 1850, 7,781. It has an undulating surface and a fertile soil, suitable for grain and pasture. The productions in 1850 were 81,847 bushels of wheat, 186,810 of Indian corn, 53,735 of oats, 10,490 tons of hay, and 153,404 lbs. of butter. There were 2 flour mills, 12 saw mills, and 5 churches. The county is traversed by the northern Indiana air line railroad from Toledo to Chicago. Capital, Ottokree. VI. A N. co. of Ind., drained by Tippecanoe river; area, 366 sq. m.; pop. in 1850, 5,982. It has a level surface, occupied partly by prairies, partly by oak openings, and partly by forests. Iron is found in some localities, and the streams furnish abundant water power. The soil is mostly of good quality, suitable for grain. In 1850 it produced 221,761 bushels of Indian corn, 70,757 of wheat, 32,843 of oats, and 4,637 tons of hay. The county contained 11 churches, and 1,300 pupils attending public schools. Organized in 1836. Capital, Rochester. VII. A W. co. of Ill., bounded S. E. by the Illinois river, and drained by Spoon river; area, 870 sq. m.; pop. in 1855, 27,968; in 1858, about 30,000. The Illinois river, which is here navigable, is the channel of a large export trade. Spoon river is valuable for water power, and nearly all the streams are bordered by a good growth of timber. The soil of the county is rich and well cultivated; the surface is undulating, and occupied partly by prairies, partly by woodlands. Coal is found in abundance. The productions in 1850 were 1,430,717 bushels of Indian corn, 274,479 of wheat, 178,784 of oats, 33,791 lbs. of wool, and 302,029 of butter. In 1858 there were 40 churches, several newspaper offices, and over 4,000 pupils attending public schools. The Peoria and Oquawka railroad runs near the northern boundary, and another line has been projected which will intersect the county E. and W., connecting the Mississippi and Illinois rivers. Capital, Lewistown.

FULTON. I. A post town of Hamilton co., Ohio; pop. in 1850, 3,224. It is a suburb of Cincinnati, and is situated just above that city on the Ohio river, having a water front of about 2½ m., and extending back a few hundred yards to a ridge of lofty hills from which is obtained a great quantity of excellent limestone. The principal business of the place is steamboat building. Beside numerous boat yards, steam saw mills, lumber yards, &c., it contains a dry dock, a rolling mill, and several churches. II. A post village and the capital of Callaway co., Mo., 12 m. from the Missouri river, and 20 m. N. E. of Jefferson City; pop. in 1850, about 500. It is extensively engaged in the manufacture of earthenware, and contains a newspaper office, several churches and academies, an asylum for the deaf and dumb, and the state lunatic asylum. The last is a beautiful edifice, 5

stories high and 210 feet long, established in 1848 on a plot of 460 acres given together with \$12,000 by the people of the county.

FULTON, ROBERT, an American inventor and civil engineer, celebrated for the successful introduction of steam navigation, of Irish descent, born at Little Britain, Lancaster co., Penn., in 1765, died in New York, Feb. 24, 1815. When about 3 years old he lost his father. He received a common school education, went to Philadelphia at the age of 17, and his name appears in the directory of that city for 1785 as that of a miniature painter. Mechanical pursuits, however, even in his youth mingled with those of the artist. Before attaining his majority he had laid by a sum sufficient to buy a small farm in Washington co. He placed his mother in possession of his new purchase, and soon afterward met gentlemen who were attracted by his talent and advised him to go to England and place himself under the tuition of Benjamin West. Following this advice, he met with a very kind reception from West, of whose home he remained an inmate for several years. On leaving his family, Fulton commenced a tour for the purpose of examining the treasures of art scattered through the country residences of the English nobility, and remained for two years in Devonshire, where he made the acquaintance of the duke of Bridgewater, the founder of the canal system of Great Britain, at whose instance, it has been said, Fulton abandoned the profession of a painter and adopted that of a civil engineer. He was employed at Birmingham about 18 months, probably in some subordinate capacity upon the canal then in progress in that vicinity. With Earl Stanhope he had an earlier and more intimate acquaintance. This nobleman was a mechanical projector of no inconsiderable pretensions, and at this time was engaged on a scheme of steam navigation by a propeller modelled on the foot of a water fowl. Fulton addressed him a letter in 1793 in which he stated the objections to this plan, and suggested some of the views which he afterward reduced to practice on the Hudson. At Birmingham he was brought into communication with Watt, who had just succeeded in his great improvement of the steam engine, with the structure of which Fulton made himself entirely familiar. During his residence here he devised an improved mill for sawing marble, for which he received a vote of thanks and an honorary medal from the British society for the promotion of arts and commerce. To this period also are referred his patented machines for spinning flax and for making ropes, and the invention of an excavator for scooping out the channels of canals and aqueducts. In 1795 he contributed some essays on the subject of canals to the London "Morning Star," and in the spring of 1796 published in London his treatise on the improvement of canal navigation. His views on the subject did not prove to be of any practical utility. With this treatise he published a

letter to the governor of his native state, pointing out the advantages of canals over turnpike roads; and sent a copy of the work to President Washington, who returned him a flattering acknowledgment. Having obtained a patent in England for canal improvements, Fulton went to France with the view of introducing them there, but his attention was soon diverted to other objects. In 1797 he took up his residence at Paris with Mr. Joel Barlow, with whom he formed a most intimate friendship, which continued through life. With Mr. Barlow he remained 7 years, during which he devoted himself to the study of the modern languages, and the sciences connected with his profession. At this time he devised the submarine boat, afterward styled a nautilus, connected with which were machines, then called submarine bombs, afterward known as torpedoes. This invention he offered several times to the French government, and once to the Dutch ambassador at Paris, without exciting their favorable attention. Negotiations were subsequently opened with him by the British government, which induced him to visit London in May, 1804. Here he had interviews with Mr. Pitt and Lord Melville, and explained to them the nature of his invention. Mr. Pitt was polite enough to say that if introduced into practice the torpedo could not fail to annihilate all military marines, but Lord Melville condemned the nautilus without a moment's consideration. In June a commission was appointed to examine Mr. Fulton's projects, at the head of which was Sir Joseph Banks. Many weeks elapsed before they gave any attention to the subject, and they then reported the submarine boat as impracticable. In Oct. 1805, he was permitted to experiment on a Danish brig of 200 tons burden with a carcass of 170 lbs. of powder. In 15 minutes from the application of the carcass the explosion took place; the brig, according to Fulton's account, making no more resistance than a bag of feathers, and going to pieces like a shattered egg shell. Notwithstanding this success, Fulton was disappointed in his hopes of government patronage, and at length embarked for his native country. Previous to leaving France, Fulton had superintended the execution of the plates of the splendid edition of the "Columbiad," printed in Philadelphia in 1807, expending on it some \$5,000; whence he derived a pecuniary interest in the work, which he relinquished by will to the widow of Mr. Barlow. The original paintings from which these plates were executed formed a part of the valuable collection he left to his family. On his return he brought with him a family piece representing Mr. West and his wife, and a portrait of himself, all from the pencil of that celebrated artist, with his "Ophelia" and "King Lear," which Fulton had purchased at a sale by the royal academy in 1805. In Dec. 1806, he arrived in New York, and immediately devoted himself to the development and introduction of his plans for sub-

marine war and steam navigation. In the month after landing he went to Washington with his models and drawings, which he explained to the heads of departments, and made a favorable impression. A certain expenditure was authorized by the government to prosecute the experiments with his torpedoes. The probability of a rupture with England, consequent on the affair of the *Leopard* and *Chesapeake*, made the summer of 1807 propitious to the patronage of his project, and on July 20 he "decomposed" a large hulk brig in the harbor of New York with a torpedo containing 70 lbs. of powder. In 1810 he again visited Washington, and at Kalorama, the seat of his friend Barlow, explained some improvements in his plans to Mr. Jefferson, Mr. Madison, and a number of members of congress assembled on his invitation. So successful was he in his explanations that congress at once appropriated \$5,000 for further experiments, to be prosecuted under the direction of the navy department. In the months of Sept. and Oct. commissioners appointed by the secretary met several times in the harbor of New York to report on Fulton's experiments. The sloop of war *Argus* had been prepared to defend herself against them under the orders of Commodore Rodgers, and the result was that she was so ingeniously defended that all Fulton's means of attack proved unavailing. Various reports were made by the commissioners, but Commodore Rodgers did not hesitate to decide peremptorily against Mr. Fulton's system, and to pronounce every part of it wholly impracticable. Fulton continued to believe in it, but on the conclusion of these experiments found himself too fully occupied with other pursuits to renew them. At an early period Fulton's attention had been turned to steam navigation. In Sept. 1798, he had addressed a letter to Earl Stanhope, proposing to communicate to him the principle of an invention "respecting the moving of ships by the means of steam." While domiciliated with Barlow at Paris he formed the acquaintance of Chancellor Livingston, then U. S. minister to France. Livingston had previously been connected with Nicholas Roosevelt and John Stevens in steamboat experiments at home. He now entered into the views of Fulton as they had been explained to Stanhope, and at once offered to provide the necessary funds for an experiment, and to contract for the introduction of the new method, if successful, into the United States. In 1798 an act was passed by the legislature of New York, repealing the act of 1787 in favor of John Fitch, and transferring to Mr. Livingston the exclusive privilege of navigating the waters of the state by steam, on condition that he should within a twelvemonth give proof of his having built a boat of 20 tons capable of a mean progress in Hudson river of 4 miles an hour, and at no time omit for one year to have a boat of this construction plying between Albany and New York. This act was from time to time continued, and Fulton was

finally included within its provisions. Meanwhile his experiments had been going on in France, particularly at Plombières, in the summer of 1802. Late in 1803 Fulton constructed a working model of his intended boat, and at the same time commenced building a vessel 66 feet in length and 8 feet in width. When finished, it did not move with the speed that was expected. In the same year, however, he sent an order to Watt and Boulton for a steam engine to propel a boat of large size, which was completed and reached New York in 1806. Eminently practical and sagacious, Fulton had meanwhile informed himself of every thing that had been attempted in steam navigation in Europe and the United States. His object was success, and there is no reason to believe that he would peril it by omitting to learn the cause of prior failures. He planned for the new machinery a boat that was completed and fitted in 1807 and named *Clermont*. Its progress through the waters of the Hudson is stated at 5 miles an hour. In the course of the ensuing winter it was enlarged to a boat of 140 feet keel and 16½ feet beam. So completely was the utility of the invention established that the legislature contracted to extend the exclusive privilege of Mr. Livingston and Mr. Fulton 5 years for every additional boat, provided the whole term should not exceed 30 years. His second large boat on the Hudson was the *Car of Neptune*, built in 1807. In the following year the legislature passed another act, confirmatory of the prior grants, and giving new remedies to the grantees for any invasion of them, and subjecting to forfeiture any vessel propelled by steam which should enter the waters of the state without their license. In 1809 Fulton obtained his first patent from the United States; and in 1811 he took out a second patent for some improvement in his boats and machinery. His patents were limited to the simple means of adapting paddle wheels to the axle of the crank of Watt's engine. Meanwhile the power of the legislature to grant the steamboat monopoly was denied, and a company was formed at Albany to establish another line of steam passage boats on the Hudson, between that city and New York. The state grantees filed a bill in equity, and prayed for an injunction, which was refused by Chancellor Lansing on the ground that the act of the state legislature was repugnant to the constitution of the United States and against common right. This decree was unanimously reversed by the court of errors, and a compromise was effected with the Albany company by an assignment to them of a right to employ steam on the waters of Lake Champlain. Legislative aid was in the meanwhile again invoked, and an act was passed directing peremptorily the allowance of an injunction on the prayer of the state grantees, and the seizure of any hostile boat at the commencement of the suit. Litigation was thus effectually arrested in New York, though by an arbitrary and unconstitutional enactment, and the waters of the state remained in the exclusive

possession of Fulton and his partner during the lifetime of the former. A similar controversy with Col. Aaron Ogden of New Jersey was compromised by advantageous concessions, which converted the opponent of the monopoly into its firmest friend, and left him some years afterward the defeated party in the famous suit of Gibbons and Ogden in the supreme court of the United States. Pending these controversies, Fulton constructed ferry boats to run between New York and New Jersey, one for a Brooklyn company, a boat for Long Island sound, 5 for the Hudson river, and several boats for steamboat companies in different parts of the United States, some of them for the Ohio and Mississippi rivers. In 1811 he was made one of the commissioners appointed by the legislature to explore the route of an inland navigation from the Hudson river to the lakes; and in 1814 he addressed a letter to the president of the board illustrating the advantages of the proposed canal. He also joined the other commissioners in their report to the legislature of that year. In the same year he took out a patent for several improvements in the art of maritime warfare. In 1814 congress by law authorized the president to build and employ one or more floating batteries for coast defence, and Fulton was appointed the engineer. He commenced immediately the construction of a war steamer, which was launched within 4 months, and was styled by the constructor the *Demologos*, though it was afterward named *Fulton the First*. This first war steamer was a heavy and unwieldy mass, which obtained a speed against the current of some 2½ miles an hour; but as the pioneer of the steam navies of the world it was regarded as a marvel, and as a most formidable engine of defence. The war having terminated before her completion, she was taken to the navy yard at Brooklyn, where she was used as a receiving ship till June 4, 1829, when she was accidentally blown up. While engaged in the construction of this war steamer, Fulton was employed by the president upon an improved modification of his submarine boat, which was also arrested by his death. Attending as a witness before the legislature of New Jersey in Jan. 1815, on an attempt made by Livingston to procure a repeal of the retaliatory act of that state levelled at the steamboat monopoly, Fulton on his return was exposed for several hours to the inclemency of the weather while crossing the Hudson in an open boat, and contracted a severe illness, which subsequent exposure rendered fatal. His death was recognized as a great public calamity, and beside the usual tributes of respect and regret from corporations and public societies, the members of both houses of the state legislature resolved to wear mourning for some weeks. Fulton was married in 1806 to Miss Harriet Livingston, a relative of the chancellor, by whom he had 4 children. He was of a slender person, above the ordinary stature, with large dark eyes, and features of manly beauty. His success in interesting capital and official influence in the pro-

ecution of his projects indicates the possession of uncommon tact, energy, patience, and enthusiasm. These qualities were aided by the address and manners of a natural gentleman. He was eminently popular in his lifetime, and his name is still regarded with affectionate veneration by his countrymen. In 1846 congress passed an act appropriating \$76,800 in full of the claims of Fulton against the United States for inventing floating steam batteries, superintending the construction of the steam frigate *Fulton*, and for the great benefits conferred on the country by his improvements in the application of steam to navigation.—In Sparks's "American Biography" (1st series, vol. x.) there is a life of Fulton by James Renwick. "The Life of Robert Fulton," by C. D. Colden, 1 vol. 8vo., was published in New York in 1817.

FULVIA, a Roman lady, of the illustrious Fulvian family, born about 80, died about 40 B. C. She was married successively to 3 renowned men, Clodius, Curio, and Mark Antony, and had part in arranging the fearful proscriptions of the 2d triumvirate. When the head of Cicero was brought to her, she pierced the tongue with her needle. To withdraw Antony from Egypt, where the charms of Cleopatra detained him, and to take revenge upon Octavianus, who had affronted her by repudiating his wife, her daughter Clodia, she excited her brother-in-law Lucius Antonius to make war upon Octavianus. The war was unsuccessful, and Fulvia escaped to Greece, was reproached by Antony, who met her at Athens, and died of shame and regret at Sicyon.

FUMIGATION, a method of applying gases and substances reduced to vapor to individuals, infected articles and localities, for medicinal or hygienic purposes. By an inaccuracy of language this name is very generally given to the medicinal agents themselves; strictly speaking, the word bears the same relation to vapors that lotion, bath, and drink bear to liquids. The substances generally used in this manner are water, alcohol, ethers, chlorine, chlorides of the oxides, sulphur, mercurials, the aromatic oily principles of plants, benzoin, camphor, iodine, &c. When directed to the air passages, they are more properly said to be applied by inhalation. When applied to the whole body, fumigations are effected either in common rooms or in apparatus constructed for the purpose, and may be either emollient and soothing, or aromatic and stimulant; in scrofulous and cutaneous diseases iodine and sulphur fumigations are frequently employed in hospitals. When locally applied, they are directed by suitable contrivances to any portion of the body. The necessary vapors are obtained by heat or chemical action; and when the great absorbing power of the skin is taken into consideration, it may easily be believed that its extensive surface may be naturally used for the introduction of most important medicinal agents. Fumigations intended to decompose miasmata, to purify the air of a district or apartments, or to remove infec-

tion from individuals or fomites (*i. e.*, articles liable to retain contagious effluvia), are more properly called disinfectants. Aromatic and odorous substances, like benzoin, camphor, vinegar, and essential oils, vapors of sugar and burned rags, and other domestic fumigations, are not disinfectants, as they do not destroy miasmata, but merely substitute one odor for another; true disinfectants are nitric and chlorohydric acids, chlorides of lime, soda, and potash, which act both upon the infecting substance and upon the mephitic air. Fumigations of nitric acid are obtained by decomposing nitre by sulphuric acid with the aid of heat. The chlorine disinfectant so highly extolled by Guyton de Morveau is made by decomposing common salt and the deutoxide of manganese by sulphuric acid. These 2 fumigations, on account of their irritating properties, can only be applied to rooms and infected articles after the removal of the inhabitants. The chlorides of lime and soda (the latter in the convenient form of Labarraque's solution), and the disengagement of chlorine by burning chloric ether in a fluid lamp, are familiar and effectual ways of fumigating infected rooms and closets, even in the presence of the sick; infected garments may be sprinkled with chlorinated waters, or may be exposed in closed vessels to temperatures even higher than the boiling point of water.

FUNOHAL, a seaport town on the S. E. coast of the island of Madeira, of which it is the capital, in lat. 33° 38' N., long. 16° 54' 30" W.; pop. 20,000. It stands on a wide shallow bay, embraced by the steep promontories of *Punta da Cruz* on the W., and *Cape Garajao* on the E., and enclosed in the rear by broken volcanic ridges. The streets are narrow, winding, and ill paved; there are no public buildings of much elegance, and the numerous churches and convents lack all architectural beauty. The English residents, who number 400 or 500, and other foreigners, have nearly all the trade, which formerly consisted chiefly in exporting wine to England and the British colonies; but the grape crop having utterly failed of late, no wine has been made since 1851, and the rearing of the cochineal insect has been undertaken in place of it. The harbor is indifferent. Fresh meat and poultry are sold at very high prices, but the richest fruits, excellent fish, and vegetables may be had cheaply in abundance. The town is resorted to by invalids on account of its delightful climate. The mean temperature is about 68° F., and the difference between the hottest and coldest months (August and February) averages only 10°.

FUNCTION (*Lat. functio*, performance), in mathematics, a quantity dependent on some other quantity for its value. Thus the height of the tide is a function of the hour of the day, of the moon's age, her declination, the change of her declination, the latitude, the form and position of the coast, the direction and force of the wind, &c. In algebra quantities are functions of each other when their mutual depend-

ence is capable of expression in algebraic forms. Algebraic functions are, in their simplest forms, the sum or difference, the product or quotient, the power or root, the exponent or logarithm, and the trigonometric or circular functions. To these we may add others, but all might by ingenuity be reduced to sum or difference. Very important uses are made of derived functions, functions which are definite functions of other functions. The principal derived function is the differential coefficient, which expresses the rate at which the original function changes for any change in the quantity of which it is a function.

**FUNDY**, Bay of, an arm of the Atlantic ocean, between the British provinces of New Brunswick and Nova Scotia, about 180 m. long, and from 30 to 50 m. wide. From its mouth, between the S. W. extremity of Nova Scotia and the easternmost point of Maine, its coasts trend N. E. until near its upper extremity it branches into 2 inlets; the N., called Chignecto bay, is about 80 m. long and 8 m. broad; the S. bears the name of Minas channel, and opens into Minas basin in Nova Scotia. At St. John, N. B., situated at the mouth of the river St. John, on the N. coast, the bay is 86 m. wide, and it continues of nearly uniform width from that point to its branching. It is deep, but difficult of navigation. It is remarkable for its extraordinary tides, which rush up from the sea with such rapidity as sometimes to overtake swine feeding on shell fish on the shores, and which rise in Minas basin 40 feet, and in Chignecto channel 60 feet. The bay contains Grand Menan and Long islands, and receives the rivers St. John and St. Croix.

**FÜNEN** (Dan. *Fyen*), an island of Denmark, having on the N. the Cattegat, W. the Little Belt, and S. and E. the Great Belt and the Binnensee; pop. 176,000. It is the largest of the Danish isles after Seeland, is about 185 m. in circumference, and forms with Langeland a circle of the kingdom. The coast is not very elevated, but is in general rugged and steep, and much indented by bays and arms of the sea. The interior toward the W. is somewhat hilly; in every other direction it is composed of large and fruitful plains, which are well cultivated, and produce abundant crops of corn, the greater part of which is exported. The largest stream in the island is the Odense-æne, which has a course of 36 m. from S. to N., and discharges into the Odensefjord, about 9 m. long, and from 1½ to nearly 5 m. wide. The largest lake is the Arreskov; it is about 9 m. in circuit, and abounds in fish. Fünen is divided into two bailiwicks—Odense, which contains the capital of the same name, and Svendborg. It has annexed to it numerous small islands.

**FUNERAL RITES.** See BURIAL.

**FUNES**, GREGORIO, an Argentine historian, born in Cordova, S. A., died in the same city in 1920. The son of a wealthy proprietor, he was educated in the university which had been founded in Cordova by the Jesuits, entered holy orders, became dean in the cathedral church, and

attempted to introduce into the university the study of the higher mathematics, the law of nations, the modern languages, music, and drawing. During the revolutionary tumults the possessions of his father were confiscated by the royalist party. Funes had acquired a thorough historical knowledge of his country, which he put to use by writing the *Ensayo de la historia civil del Paraguay, Buenos Ayres, y Tucuman* (3 vols. small 4to., Buenos Ayres, 1816 *et seq.*), which contains an excellent epitome of the annals of a vast territory, of which but little was yet known in Europe.

**FÜNFKIRCHEN** (five churches; in Hungarian *Pécs*, which, in the language of the surrounding Slavic tribes, means five), a town of Hungary, capital of the county of Baranya, 105 m. S. S. W. from Buda; pop. 18,500. It is surrounded by rich vineyards, in the vicinity of mineral springs, and is one of the pleasantest towns of Hungary. It contains an old Gothic cathedral, built on the site of a Roman castle, 2 monasteries, a public library, several schools and hospitals, and a theatre. The population consists chiefly of Magyars, but the Slavic and German inhabitants are also numerous. The town has considerable commercial industry, its trade being chiefly in coal, alum, vitriol, wine, grain, tobacco, rape seed, wool, and other products of the neighboring country. Fünfkirchen is supposed to be the *Colonia Serbinum* of the Romans. In the time of Hungarian independence it was larger and much more important than now. History mentions that 2,000 of its students marched out to the battle field of Mohács, where the Hungarians were defeated by the Turks under Solymán, Aug. 29, 1526. This sultan passed some time at Fünfkirchen, during the siege of the fortress of Szigeth, and was so delighted with the place that he called it a paradise on earth. It remained in the hands of the Mussulmans from 1543 till 1686. During the late Hungarian revolution it was mostly in the hands of the Austrians.

**FUNGI**, an extensive family of cryptogamic plants, generally known under the names of mushrooms, toadstools, rusts, smuts, bunt, and mildews. They are, with rare exceptions, parasitic plants, growing upon and drawing their nourishment (or at least a part of it) from the substance of the object they infest. They occur in all parts of the globe, finding their maximum in the moist temperate zones; abounding in a climate like that of Sweden, which has produced more species upon a given area than any other known locality, except perhaps the southern United States. They are found wherever there is decaying vegetation, upon which they feed; and in some instances they prey upon living tissues, which they destroy by their attacks. Nothing of vegetable origin is free from their ravages when exposed to influences favorable to their growth. They are found also on animal dejections, on insects, whose death they cause, on the human skin, and even on bare stones, on iron which was in a forge a few

hours before, on read, and on chemical solutions. The disease in silkworms is caused by a mould (*Botrytis bassiana*). The flies found adhering to our windows in autumn, fixed by the proboscis, are destroyed by a mould (*sporendonema musce*), which produces the little white rings between the abdominal segments and discharges its seed upon the glass around like a little cloud. The celebrated caterpillar fungus of New Zealand (*cordyceps Robertsii*), which infests the caterpillar of *hepialus virescens*, is a remarkable instance. Our American caterpillars are destroyed by another species (*O. militaris*). *Orygena equina* grows on the hoofs and horns of animals. Some of the microscopic species cause cutaneous disorders in the human system, and others have been found in the brains of birds. (See EPIPHYTES.) But these latter are exceptional cases. They principally affect decaying vegetation. Their vegetating fibres are of such extreme minuteness that they penetrate the hardest woods, and are thus powerful agents in their decay. Their delicate, evanescent, fragile mycelium fastens upon the fallen giants of the forest and hurries their slow decomposition. They attack the housekeeper's bread, cheese, vinegar, paste, yeast, preserves, and mustard, the farmer's corn and potatoes, the vintager's grapes, the gardener's berries, and the joiner's timber; while a host of forms prey upon the living tissues of plants, scarce any of which are free from their depredations, and many of which are assailed by a dozen different species at once. —Notwithstanding the long time which has been given to the study of fungi, there is no class of organized structures so little known. Their microscopic character, their abnormal growths, their polymorphic forms, have baffled the researches of the closest observers. Even at the present day, with all the light of modern science, the improved means of research, and the multiplied observations of a host of zealous students, a large proportion of the microscopic forms are but imperfectly understood. A century's study has left the subject an undeveloped and disputed field. It is only within a comparatively short time that an approach has been made to a clear insight into their laws of growth and reproduction. There are those, even now, who deem them to be of spontaneous or chemical origin, an opinion which their sudden appearance in vast numbers after a long rest, and their occurrence in closed cavities, have tended to establish. But this idea has been clearly disproved. That they are perfect plants, growing from and reproducing bodies analogous to seeds, is too firmly established to be questioned. When we ascertain that a single plant produces millions of these reproductive bodies, so small that they float on the air scarcely influenced by the force of gravity, that they may remain an indefinite period inert, and be called into sudden vitality by atmospheric changes favorable to their germination, their sudden appearance can be readily understood. They have been traced through their metamorphoses. The infinitesimally small spore has been watched in its growth

into a perfect plant; and one such observation, unquestionably made, is positive proof of their being perfect plants, having a development following certain laws; and we need not resort to the unsatisfactory theory of spontaneous or accidental origin, if indeed we are able to conceive of any vast assemblage of organized structures permanently reproductive, and identical through centuries, being the result of chance chemical action.—Fungi are of purely cellular growth. They form no woody fibre like flowering plants, nor do they form chlorophyll in their tissues. They consist of mere aggregations of homogeneous cells. Though many become corky, woody, and horny in the course of their growth, they have no other identity with true wood than of density and weight, possessing none of the complex structure of flowering plants. They exhibit a wonderful variety of external forms; but the composition of them all is the same, an aggregation of simple cells. Their earliest vegetation is a prolongation of the membranes of their spores, a name given to their reproductive seminal dust, which, though performing the office of seeds, differs from true seeds in being mere individual cells. From these arises a delicate, minute, webby growth, called the *mycelium*, which is the true vegetation of the plant, and which gives rise to the reproductive bodies at once, or builds up a receptacle which contains them. It is this mycelium which penetrates and destroys the object on which it is parasitic. It is made up of radiating and intertwining fibres formed of rows of cells placed end to end. These are in many instances so minute that they easily traverse the tissues of living plants and the pores of solid wood. From this mycelium grow the spores, which in their simplest form consist of the terminal cell or cells, which drop off to form new plants. They are of the extremest minuteness, appearing to the eye like a mere cloud of impalpable powder. As we rise in the scale, special branches and processes are formed to bear the spores, either singly or in groups. Still more complex forms build up a special organ called the *peridium*, within which the spores arise contained in little sacs termed *asci*. The large fleshy growths which we meet with in the woods or on trees are processes belonging properly to the reproduction and not the vegetation of the plant. They are very disproportionately large compared with the mycelium, and consist of a main stem called a *stipe* and an expanded top called a *pileus*, on which these spores are borne in various ways, on gills, ribs, prickles, spores, &c. The mycelium is sometimes reduced to a mere trace of evanescent, floccose growth; while the reproductive body becomes a fleshy mass, several pounds in weight. But the spores are always minute, being sometimes only  $\frac{1}{1000}$  of an inch in diameter.—Fungi occupy an intermediate position between algae and lichens, into which orders they gradually merge at different points. Indeed, so



nice is the distinction at times, that some systematists have reduced lichens to a sub-order of fungi. They differ from lichens in deriving their sustenance from the object on which they grow (though this has exceptions), in not producing a foliaceous thallus, and in not forming green chlorophyll; from algae, in being aerial, not aquatic, and in deriving their nourishment from their matrix and not from the surrounding medium. Such, at least, are the main points of difference. Those species of fungi which are found in fluids, such as the yeast and vinegar plants, are now proved to be merely submerged mycelia of certain moulds (*penicillium*), which do not attain their perfect stage until they reach the air. The propagation which takes place in fluids is due to a power the mycelium possesses of retaining its vitality under a variety of circumstances, of suffering division and enduring extremes of temperature. Beside this, it has a propagating power analogous to that of budding. In some aerial forms it goes on reproducing itself in peculiar ways, and rarely reaching the normal or perfect asigerous fructification. For this reason many species have been thought to be distinct plants when they are merely arrested stages of growth of one single species. Some aerial forms never reach a further growth than a compact, dense mass of mycelium. Oak trees sometimes contain a solid mass of a leathery texture (*xylotroma giganteum*), which never advances beyond that stage. The genera *sclerotium* and *rhiomorpha*, with their so called species, are mere compact bodies of mycelium, which have in some instances been artificially forced to develop themselves, and have produced plants of a widely different structure. The ergots of grain are objects of this kind. Tulane and others have watched their development into species of *cordyceps*. These forms remain constantly arrested; but very many of those which under favorable circumstances reach perfection remain similarly checked, and confuse the student with their multiple forms. This has caused the naming of hosts of species which are merely forms of others. There is no branch of science whose synonymy is more burdensome. It is almost a hopeless task to attempt to identify the species of authors by description alone, the plant itself being necessary for comparison. Long and continued observations are required to determine and connect the many forms which a single fungus may assume in the course of its existence.—Few objects in nature exhibit more gorgeous colors. The larger, fleshy forms present an endless variety of graduated tints. Some of the *boletis* exhibit on being broken a remarkable change of color, the white or yellowish hue of the interior changing instantly to a vivid blue. This is supposed by Prof. Robinson to be due to a molecular and not to a chemical change. Their texture is as variable as their color. Some are almost fluid, others fleshy, papery, leathery, corky, or hard and bony. Their size is equally various, from

mere specks to masses some feet in girth. Their rapid growth is astonishing. Puff-balls sometimes grow 6 inches in diameter in a night. Masses of paper pulp thrown out hot from a vat have been found within 24 hours filled and swollen with a species of *agaricus*. Schweinitz records the growth of a species of *athalium* found on a piece of iron which was heated the night before in a forge. Some of the ephemeral *ooprini* grow up in a night and melt away in the morning sun. Other species, like the *polypori*, grow very slowly and add a new layer every year, covering that of the previous season. Their expansive force in growing is very great. Notwithstanding their soft, yielding texture, agarics are able to raise heavy stones under which they spring up; and Bulliard tells of a *phallus* which burst a glass vessel in which it had been confined. They are meteoric in occurrence, depending upon peculiar states of the atmosphere. They generally appear in the greatest abundance in moist autumn weather, though some are found wherever there is moisture. Some depend so much on peculiar states of the atmosphere, perhaps electrical, that they appear suddenly and then disappear for a while. The pustular forms, however, which abound on the dead bark of trees, shrubs, old stumps, and fallen twigs, are more durable for their more solid structure. Some species of *agaricus* possess a remarkable luminosity, and certain *rhiomorpha* growing in mines shed a phosphorescent light of extreme brilliancy. Fungi differ from flowering plants in their chemical influence upon the air. They absorb oxygen and exhale carbonic acid, performing the same office in this respect as animals, which they most resemble in chemical composition, in being highly azotized. The odors they emit in decay are more like putrescent animal than vegetable matter. The fleshy sorts generally possess a peculiar earthy odor, but some species of *phallus* and *clathrus* emit a most intolerably offensive stench, which will render a close apartment untenable. Others, on the contrary, are very agreeable to the smell, and some in drying acquire a fine aroma. They are quite as variable to the taste. The prevailing flavor is rather negative and peculiar to the order; but they are also bitter, acrid, biting, astringent, oily, and nauseous, as well as savory and agreeable. Most of them lose these qualities in drying.—Fungi have been used as an article of food for untold centuries. The writings of the ancients make frequent mention of them as among their most esteemed viands. They are extensively eaten in Europe by all classes, and many works have been written laudatory of their virtues, with copious directions for dressing them in a great variety of ways. Notwithstanding the virulent poisonous qualities of some, others are eagerly sought for, and in some places it is said that the people have burned down woods to get certain species of fungi whose growth followed the combustion. But in America they have been regarded as noisome and disgust-

ing by the great mass of the people; they have been usually despised as the unsightly evidences of decay, rather than eagerly collected as delicious food, which many of them are. Badham states that the return of taxed mushrooms in Rome during a period of 10 years gave a yearly average of between 60,000 and 80,000 lbs. weight, beside the untold quantity consumed which did not fall under government notice. He estimates that in that city alone the annual consumption would reach a value of \$20,000. They form an extensive article of food for the poor all over Europe, and some species are sought for at high prices by the rich. The species commonly cultivated, the mushroom proper, is the *agaricus campestris*, which grows wild in old fields and pastures, but is propagated by planting its spawn, which is the mycelium of the plant, in hot-beds. Although this is the most widely used, many other species are equally excellent. The truffle (*tuber cibarium*) grows beneath the ground, and is eaten with avidity by different animals. Dogs are trained to scent it out by those who collect truffles for market. Their reputation as aphrodisiacs is thought to be unfounded, having its origin in the old doctrine of resemblances. *Polyporus tuberaster* grows from the celebrated fungus stone *pietra fungbia*, which is a mass of earth traversed by the mycelium of the plant; the latter is watered from time to time and produces successive crops. The heads of poplar trees are watered in autumn, and they then bear the *agaricus caudicinus*, greatly esteemed. Blocks of the hazel tree are singed over straw and watered, and they produce in abundance the *polyporus corylinus*. Among other species eaten, the principal are *agaricus prunulus*, *orcella*, *procerus*, and *exquisitus*, *lactarius deliciosus*, *cantharellus cibarius*, *boletus edulis*, *marasmius oreades*, *hydnum repandum*, *fistulina hepatica*, *morchella esculenta*, and *helvella crispa*. These are all fleshy fungi. Many other species known to be at times poisonous are eaten in different countries in different ways. They are dried, pickled, salted, and cooked in an endless variety of fashions. Some of the most virulent poisons are found among fungi, and many fatal accidents have arisen from the eating of poisonous species, yet fungi which are known to be ordinarily injurious are eaten with impunity by some. Rye meal containing large quantities of ergot produces a terribly disgusting and fatal gangrenous disease; while the ergots themselves are eaten largely in the north of Europe by children, under the name of St. John's bread, without any such result. Pickling and salting renders many innocuous. *Agaricus muscarius* is one of the most injurious; yet it is used as a means of intoxication by the Kamtchatkades. One or two of them are sufficient to produce a slight intoxication, which is peculiar in its character. It stimulates the muscular powers, and greatly excites the nervous system, leading the partakers into the most ridiculous extravagances. The only fungus used at the

present day in medicine is the ergot of rye, sometimes employed in cases of protracted labor. Several others have been used in times past like the *cordyceps Sinensis*, a sphaerioid species parasitic on a caterpillar; but these are now thought to be of no value. The *lycoperdons* or puff-balls have been used as styptics. Some *polypori* make admirable razor strops when sliced with a sharp knife. *Polyporus fomentarius* and *igniarius* have for many years furnished the punk which is used as tinder; the corky portion being pounded till its compact mass of soft, silky fibres becomes loosened and flexible. *Agaricus muscarius* is used as fly poison.—Some fungi are among the greatest pests of the agriculturist. The rusts, smuts, and bunt of grain are all fungi of the genera *uredo*, *ustilago*, and *puccinia*. Their mycelium penetrates the tissues of the plants, destroys their vitality, and bursting through their cuticles, covers them with myriads of their orange, brown, yellow, or black spores. They probably induce decay by a chemical influence which they exert on the juices of the infested plant, as well as by their mechanical interference with its organism. It has been a question how their spores are carried into the tissues, where their earliest growth is entirely separated from the outer atmosphere. But when we remember their extreme minuteness, we can understand that they may be drawn up with the fluids which enter the roots, or receive them directly into their tissues through the infinity of breathing pores with which the surfaces of the plants they infest are perforated. The mildews of the grape and other fruits are myceloid growths, which in certain stages have been thought to be perfect plants (*oidium*), from their possessing a power of reproduction. Certain cells take on a vesicular growth filled with a mass of minute bodies which were thought to be the true fruit. But the later observations of Léveillé, Tulasne, and others, have shown that these are arrested stages of growth of an entirely different ascigerous genus, *erysiphe*. These produce their fruit in minute black pustules, from the base of which peculiar radiating processes arise, sometimes of great beauty. The mildews grow on the surface of fruits, and injure them more by choking up their pores and mechanically confining them with their dense, felt growth, than by abstracting their juices. The potato rot is accompanied by a rapid growth of the mycelium of *botrytis infestans*, which penetrates the leaves, stems, and tubers, inducing rapid decay. It appears on the surface in the form of a minute white mould. Many other plants are similarly affected. *Boleti* are sometimes traversed by a minute mould, *sepedonium chrysospermum*, which gives a golden yellow hue to the flesh. Dry rot in timber is caused by the penetrating mycelium of *merulius lacrymans* and *polyporus destructor*. The black excrecent growth on plum trees is occasioned by the *sphaeria morbosa*, which covers the warts its mycelium has made with its minute black, compacted *perithecia*. The fairy rings which, in olden times, were

thought to be the scenes of midnight fairy revels, are produced by the growth of different species of *agaricus*. As they exhaust the soil by one year's growth, their mycelium pushes into the richer portion around; and thus they extend the circle of their growth, furnishing by their decay a manure for the next year's grass, which is darker and denser in consequence. This is one of the many instances where exact observation has reduced the fanciful ideas of superstition and poetry to the less romantic but more satisfactory basis of natural causes.—Fungi have been classified in various ways by different mycologists. By the early writers they were arranged according to their external appearances; but as more exact means of observation multiplied, their microscopic structure became better known, and a nearer approach was made to a classification in consonance with their true affinities. From Oësalpinus in 1588 to Nees von Eäenbeck in 1817, the progress of knowledge was comparatively small for a period of nearly 250 years. But in 1821 appeared the *Systema Mycologicum* of Elias Fries, a work of the most learned and profound character, evincing a comprehensiveness and thoroughness far surpassing all that had preceded it. It is even now the great work to which all students refer, though since that time a host of observers have been exploring this obscure field, and collecting a vast array of facts concerning the laws which govern these minute organisms. Minds of the first class are engaged at present in the elucidation of their structures—Montagne, Léveillé, Tulane, Berkeley, Desmazières, and many others. The latest system given to the world is that in the Rev. Mr. Berkeley's "Introduction to Cryptogamic Botany," which is essentially similar to that of Fries. The two principal divisions are: *sporidiiferi*, spores contained in special sacs called *asci*; and *sporiferi*, spores naked, not enclosed. These are again subdivided into 6 principal orders, all formed on the mode in which the spores are borne, viz.: 1. *Ascomycetes* (Berk.), spores produced in little sacs (*asci*), and formed out of the protoplasm they contain. This order comprises a vast number of the black, pustular growths, abundant on dead wood, bark, twigs, leaves, &c. They are generally formed of a mass of carbonized cells arranged in the form of hollow spheres or cups called *perithecia*. Within these grow the *asci* containing the spores, which escape either from a pore in the perithecium or by its breaking up irregularly. The basal cells bearing the *asci* are collectively termed the *hymenium*. Among these are the mildews (*erysiphe*) and the black mildews (*capnodium*), and the whole great tribe of *sphæria*. The truffles (*tuber*) also belong here. They are subterraneous, fleshy forms, whose substance is intersected by veins which are inward folds of the hymenium, covered by the expanding growth of the fleshy receptacle. The morels (*morchella*) and the *helvelles* are carnosae, bulky forms, which have their *asci* on the outer surface of a variously folded, wrinkled, and pitted

hymenium. The *cyttaria* is akin to these, of a sub-gelatinous consistence. These are all made up of compacted cells, forming horny, carbonized, or heavy, fleshy masses. 2. *Phycomycetes* (Berk.), spores growing in bladder-shaped cells on the end of delicate, individual, scattered fibres, composed of cells applied to each other in a linear series. A small group comprising the true moulds (*mucor*). 3. *Hyphomycetes* (Fr.), spores naked, simple, or aggregated on the ends of fertile threads. These differ from the last in the naked growth of the spores. Here belongs the great host of minute moulds which cover almost every substance exposed to dampness with their floccose fibres. Nothing organic is free from their attacks. Their colors are sometimes extremely beautiful. To this order belong the mould of the potato rot (*botrytis infestans*), and many which induce decay in fruit (*oidium*), the bread and cheese moulds (*penicillium*, *aspergillus*), the rigid black moulds (*cladosporium*, *helminthosporium*), and the yeast and vinegar plants, which are submerged mycelia of *penicillium*. 4. *Coniomycetes* (Fr.), spores naked on the ends of filaments or vesicles; hymenium sometimes obsolete, sometimes contained in a perithecium. This order differs from the last in having scarcely any filamentous growth, and in having the spores produced in the utmost profusion, greatly disproportionate to the rest of the plant. It comprises an infinity of minute pustular forms, which infest the tissues of every variety of plant, many presenting to the eye but a mere speck on their surface. Here belong the whole family of rusts, smuts, and bunt (*puccinea*, *uredo*, *ustilago*, *tilletia*, *acidium*, &c.), which creep through the tissues of living plants, and finally burst forth on the exterior and fructify in dense, dusty masses, which cover their whole surfaces. Different species affect different organs, some being on stems and leaves, others on flowers and fruit. They are the scourge of the farmer, whose fields they devastate. The savin trees (*juniperus*) are attacked by a peculiar genus (*podisoma*), which bursts from their bark and swells under the influence of moisture to a gelatinous mass. It also occasions the globular excrecent growth called cedar apples, from orifices in which it protrudes in long orange-colored spurs, formed by the spores, tipping the aggregated mass of filaments. The black, irregular scars on apples are caused by the *spilocaea fructigena*. An extensive group of this order comprises those minute pustular forms which, resembling the true ascigerous fungi in many respects, differ in producing their spores on the ends of the filaments instead of being contained in *asci*. There is great obscurity overhanging this whole group. They exhibit themselves in so many anomalous forms that it is almost impossible to establish limits to genera which may be clearly understood. Writers on the subject record great numbers of genera, but hardly any two agree upon their characters, and the whole subject is burdened with an inhar-

monious synonymy. New light has been shed upon the subject of later years by the observations of Berkeley, Léveillé, Tulasne, and others, who have pretty clearly established the fact that many so called genera are merely stages of growth of true ascigerous fungi. Some genera, such as *erysiphe*, are known to produce several different kinds of reproductive bodies; and Tulasne has carried his researches into this manifold fructification, showing that many ascigerous species are attended by processes (*pycnidia*) which produce minute bodies (*spermatia*, *stylospores*) differing much from true spores, and growing beside them, sometimes within the same receptacle. He has demonstrated that certain growths recorded as distinct species of different genera and orders are, in fact, different forms of one single plant, whose perfect state is ascigerous. If such be true of the few whose progressive growth has been followed, we may safely conclude that the whole mass of coniomycetoid species, or at least those of the sub-order *sphaeronemati*, may be arrested or non-developed stages of growth of higher ascigerous forms. Such being the case, the classification of this whole order of plants will one day need rearrangement. 5. *Gasteromycetes* (Fr.), mycelium gelatinous, floccose, or cellular, giving rise to a stalked or sessile peridium, composed of one or more coats; the spores borne on the apices of filaments lining the interior. This includes the whole tribe of puff-balls, as well as the subterranean fungi which look like truffles, but are dusty and smutty within. The peridium is generally of a rounded form, cracking in various ways at maturity, and giving forth myriads of spores like a cloud of dust. In some the hymenial tissue dries up at maturity, leaving the spores free (*lycoperdon*); in others it resolves itself into a fluid which drips from the elongated receptacle (*phallus*). In some it retains its form, after parting with its spores, in an intricate mass of anastomosing fibres (*trichia*, *arcyria*). The *athalium*, which infests the hot-beds of greenhouses, belongs here. The earth stars (*geaster*) are peculiar in the dehiscence of the outer peridium, which splits into segments and unfolds in a starry manner; it is also very hygrometrical, unfolding or closing as it is moist or dry. The little bird's nest fungus (*crucibulum*) is peculiar in having its spores in distinct masses at the bottom of its nest-like peridium, looking like little eggs. *Sphaerobolus stellatus* has the remarkable power of projecting its sporangium to a great distance; the lower, internal part of the peridium is suddenly inverted at maturity, ejecting its soft sporangium, of the size of a mustard seed, several inches. The species of *phallus* and *clathrus* are notorious for the intolerable stench of their dissolving hymenium. 6. *Hymenomycetes* (Fr.), mycelium floccose, webby, giving rise to a distinct hymenium, borne either immediately on the mycelium or on special receptacles bearing the spores on gills, wrinkles, tubes, prickles, &c. Here occur the jelly-like *acidia*, so common

on trees after rains; the branching coral-like *clavaria*, abounding in our woods in autumn, all of which are edible; the corky *polyporti*, bearing their spores in minute, compacted tubes beneath the receptacle termed a *pileus*; the *boleti*, which resemble the last except that they are fleshy, and of which many are eaten; the *hydna*, which bear their spores on the exterior of prickly-like processes; and, lastly, the *agarici*, which include the edible mushrooms and kindred forms, whose spores are borne on radiating blades beneath a cap borne up by a stem like an umbrella.—Mycology, as the study of fungi is termed, is among the most recondite of pursuits. Among the authors whose works are of principal value are Berkeley, Bulliard, Corda, Desmazières, Fries, Greville, Klotzsch, Kromholz, Léveillé, Link, Montagne, Nees von Esenbeck, Persoon, Schaeffer, Schweinitz (for American species), Sowerby, Tulasne, Vittadini. The principal American authors of the present day are the Rev. Dr. M. A. Curtis and Mr. H. W. Ravenel.

FUNGIBLE, a word supposed to be derived from the phrase *functionem recipere*, in the civil law. It is not much known in English law, but is often used in French and Scotch law, and has recently been introduced into American legal language. It is used to mean what we have no other word for, that is, *res quæ pondera, numero, et mensura constant* (1 Bell's "Commentaries," p. 255), or things which may be returned or replaced by any others of the same kind, in contradistinction from those which must be returned or delivered specifically. Thus money is nearly always a fungible, because so much paid in any way that is a legal tender satisfies a claim for it. But it might happen that A lent B certain specific coins, for a specific purpose, which were to be specifically returned; and these would not be fungibles. If one lent to another corn, or meat, or manure for his fields, to be used, and return to be made in a like quantity of things of like quality, they would all be fungibles.

FUNNEL, an instrument for facilitating the transfer of fluids into vessels furnished with small apertures, being of the nature of a pipe opened out into a wide conical-shaped mouth, into which the fluids are first poured, their discharge being through the small end, which is placed in an aperture of the vessel to be filled. They are also of great service in filtering by the support they furnish to the filter and its contents. For chemical purposes funnels of porcelain or glass are commonly employed; recently excellent funnels have been made of gutta percha, which are free from risk of injury by breaking, are easily kept clean, and are liable to be affected by but few chemical agents.

FUR, the thick, warm covering of certain animals, especially such as inhabit the lands or waters of cold countries, distinguished from hair by its greater fineness and softness; also, and most generally, the skins of such animals dressed with the fur on. Before being dressed by applications upon the inner side to keep the material soft, the

skins are known in commerce as peltry. Fur is used especially for winter clothing, for which it is well adapted not merely by reason of its important qualities of warmth and durability, but also on account of its great beauty. In all cold climates man has availed himself liberally of the warm covering with which nature has clothed the animals around him; but the wealth of the most favored nations has drawn to them the most beautiful furs, in whatever part of the world they are procured. Skins of animals were among the first materials used for clothing. Before Adam and Eve were driven from the garden of Eden they were furnished with coats of skins (Gen. iii. 21). The appearance of Esau is compared to that of a hairy garment (Gen. xxv. 25). The ancient Assyrians used the soft skins of animals to cover the couches or the ground in their tents (Judith xii. 15); and the Israelites employed badgers' skins and rams' skins dyed red as ornamental hangings for the tabernacle (Exod. xxxix. 84). The ancient heroes of the Greeks and Romans are represented as being clothed in skins, Æneas wearing for an outer garment that of a lion, and Alceste being formidably clad in that of the Libyan bear (Virgil, lib. v.). The Odyssey also has occasional reference to the same costume. Propertius designates the earlier senators as *pellati*; but the Romans of later periods regarded the clothing as that of barbarous times and people, associating it with the habits of the rude Scythians and of the other savage tribes on their eastern and northern frontiers. But in the 3d or possibly the 2d century of the Christian era, fur dresses appear to have been in use and in high estimation with the Romans. They were introduced by the northern tribes, and were probably at that time prepared with much skill. Ancient historians make frequent mention of this kind of clothing in use by the people of various nations. Herodotus speaks of those living near the Caspian sea wearing seal skins; and Cæsar mentions that the skin of the reindeer formed in part the clothing of the Germans. Ælianus in his history of animals, written in Greek in the 2d century, makes mention of the skins of the Pontic mouse, which were sent to Persia, and which were sewed together to form warm dresses. Plutarch speaks of Pharnabazus the Persian as reclining upon soft furs. Beckmann thinks that the term *mus* was applied as a general name for most strange small-sized animals, as the term *bos* with some expletive was to the larger ones met with in other countries; but while some think the earless marmot was commonly meant by the Pontic or Caspian mouse, he believes that the animal was the ermine, named probably from Armenia, to which country it was introduced at an early period from more northern regions. The fur of the beaver was in use, either in the skin or for manufacturing fabrics, in the 4th century; the animal was known as the Pontic dog. The sable of the far off regions of Siberia was not known till many centuries later; but it was the produc-

tiveness of that region in furs that chiefly prompted the Russians to its definitive conquest.—In the early periods furs appear to have constituted the whole riches of the northern countries; they were the principal if not the only exports; taxes were paid with them, and they were the medium of exchange. So it was in our own western territories in the latter part of the last century, and still continues to be among the Indians. In the 11th century furs had become fashionable throughout Europe. The art of dyeing them was practised in the 12th century, chiefly of a red color. In the history of the crusades frequent mention is made of the magnificent displays by the European princes of their dresses of costly furs before the court at Constantinople. But Richard I. of England and Philip II. of France, in order to check the growing extravagance in their use, resolved, in the crusade about the end of the 12th century, that neither should wear ermine, sable, or other costly furs. Louis IX. followed their example in the next century; and well he might when the extravagance had grown to such a pitch that 746 ermines were required for the lining of one of his surcoats. In these times the use of the choicer furs, as those of the ermine, sable, the vair or Hungarian squirrel, and the gris, also supposed to be a squirrel, was restricted to the royal families and the nobility, to whom they served as distinctive marks and badges of rank, and were for this purpose introduced into armorial bearings. These privileged persons applied them lavishly to their own use; and the fashion extended to the princes of less civilized nations, if it was not indeed originally adopted from them. In 1252 Marco Polo observed that the tents of the khan of Tartary were lined with rich skins, and among them those of the ermine brought from countries far north—"from the land of darkness." In 1387 the use of furs, which had become common in England, was prohibited by Edward III. to all persons not able to expend £100 per annum. The early trade of western Europe in furs was through the Hanse merchants on the south coast of the Baltic, who received them from the ports of Livonia. In the 16th century a direct trade was opened between the English and Russians; and a company of the former, protected by the czar, established posts on the White sea with a warehouse at Moscow, whence they sent trading parties to Persia and the countries on the Caspian. The czar sent presents of beautiful furs to Queen Mary and to Queen Elizabeth; but the latter prohibited the wearing of any but native furs, and the trade soon declined and was abandoned. Siberia was conquered by the Russians in 1640, and its tribute was paid in furs. This country also furnished large quantities to China; but the choicest kinds, the precious ermine of Yakootsk, the brilliant fiery foxes, and the best sables, were taken to Moscow and Novgorod for the use of the princes and nobles of Russia, Turkey, and Persia.—The early settlers of the northern

provinces of North America soon learned the value of the furs of the numerous animals which peopled the extensive rivers, lakes, and forests of these vast territories. They collected the skins in abundance, and found an increasing demand for them with every new arrival from the mother country. Trinkets, liquors, and other articles sought for by the native tribes, were shipped to Quebec, and forwarded up the St. Lawrence to Montreal, which became among the French settlements the principal trading post. The Indians were stimulated by trifling compensation to pursue their only congenial peaceful occupation. The Frenchmen, readily assimilating to the Indian habits, became themselves hunters and explorers. Of hardy constitutions, roving propensities, not deficient in courage, yet of mild and peaceable dispositions, they were admirably adapted to penetrate with safety among the strange tribes of savages, and to conciliate and secure the good will of these people, or manage them by their superior address. They carried moreover the fire water and the gewgaws which they well knew how to use to their own advantage. The classes of *voyageurs* and *coureurs des bois*, to which this trade gave rise, became the pioneers of all the new settlements, and to this day they continue to be the main dependence of the exploring expeditions sent into the distant interior. Unrestrained by law and beyond all control, they fell into excesses which the French government sought to check by restricting the trade, under penalty of death, to those upon whom it conferred licenses; but the same voyageurs were employed by the merchants into whose hands the licenses came. The latter fitted out expeditions of two canoes each, with goods to the amount of 1,000 crowns for 6 voyageurs, who were expected to return in a year or two with double the number of canoes and peltries to the value of about 8,000 crowns. In this case, the merchant being repaid his outlay, cost of license, and proportion of profits, the share of the voyageurs would be about 600 crowns each. To protect and control the trade forts were soon required in the Indian territory. That established at Mackinaw was not long in becoming an important central point, taking in some respects the place of Montreal itself. The English during this time had not been neglectful of their interests in securing a share of this valuable trade. Its importance early engaged the attention of wealthy and influential parties connected with the government of Great Britain, as Prince Rupert, the duke of Albemarle, the earl of Craven, Lord Ashley, and others. After a successful enterprise in which they had embarked they obtained from Charles II. in 1670 a charter of incorporation, giving to them full possession of the territory within the entrance of Hudson's straits not already granted to other subjects, or possessed by those of any other Christian prince or state. In this was included the monopoly of all trade in these regions, and this was the origin of the Hudson's

bay company. The territory they claimed extended from Hudson's bay west to the Pacific, and north to the Arctic ocean, excepting that occupied by the French and Russians. They soon formed settlements upon the rivers which empty into Hudson's bay, and carried on their operations with great vigor and success. Though opposed by the French settlers and adventurers, who resisted their claims and subjected them to vast expenses and losses, the company in 1684 paid a dividend of 50 per cent., in 1688 the same, and in 1689 one of 25 per cent. In 1690 the capital stock was trebled without call upon the shareholders, and a dividend of 25 per cent. upon the new stock was paid. The company continued to prosper notwithstanding the persistent opposition of the French. Their forts or factories were extended further into the interior of British America; and their power was supreme throughout the country, and in great measure over the Indians whom they employed to collect the skins. Still their charter had never been ratified by act of parliament. In 1749 a question arose in parliament respecting their rights, which was decided in their favor. But the Canadians do not appear to have admitted their exclusive privileges, particularly over the large territories ceded by the French to the English in 1763. They therefore organized a company in the latter part of the last century, composed of some of the chief merchants of Canada, under the name of the north-west company. Their head-quarters were at Montreal, and their operations were carried on with great energy in the interior, extending to the rivers that flow into the Pacific, where they established factories about the year 1805. The annual meetings of the active partners were held at Fort William at the mouth of Pigeon river, on the N. shore of Lake Superior. Their clerks and servants, of whom the former were mostly young Scotchmen, and the latter Canadian voyageurs, amounted to about 2,000 in number. The company thus soon became a formidable competitor with the Hudson's bay company for the furs of these regions. In 1813 they acquired possession of Astoria on the Columbia, the settlement having been sold to them by Mr. Astor's partners in consequence of the war between the United States and Great Britain. The two companies were afterward involved for two years in actual war. In 1821 they united in one company, called the Hudson's bay company, with the privileges of the old company extended by act of parliament over all the territory occupied by both. The license granted on May 30, 1838, for 21 years, expired in 1859. Owing to the depreciation in the value of beaver skins and others of this class, which formerly made a large portion of the profits of the company, the renewal of the license is of comparatively little importance. The company, however, possess large establishments scattered from Labrador to the Pacific, and from the northern boundaries of Canada to the Arctic ocean, which are of no value for any other purpose, and which yielded

in 1855 a dividend of about 6 per cent. on a capital of £400,000. Their affairs in America are conducted by a chief superintendent (now Sir George Simpson), a deputy governor, and a committee of 7. They employ 25 chief factors, 28 chief traders, 152 clerks, 1,200 regular servants, and an indefinite number of natives as occasion requires; also a steam vessel and 5 sailing vessels, all armed. Their great sales of furs take place in the month of March, so timed as to be completed before Easter, and again in September, every year in London, and are attended by purchasers from the continent, from the United States, and other parts of the world. A great annual fair for the sale of furs, to which many are taken from London, is held at Leipsic, a famous mart in this trade.—The importance of the fur trade led to the early settlement of the western territories of the United States. The first organization for carrying it on was that commissioned in 1762 by Mr. D'Abadie, director-general of Louisiana, made up by merchants of New Orleans, under the title of *Pierre Liguette Laclede, Antoine Maxan, and co.* Laclede, the principal projector, conducted the expedition to St. Genevieve, Mo., arriving there Nov. 2, 1763. The same year he selected for the site of his establishment the spot now occupied by the city of St. Louis, and then gave it the name it has since borne. The place soon became of similar importance to Mackinaw and Montreal. The brothers Auguste and Pierre Chouteau were of his party, and they remained ever afterward in the country, connecting their name not merely with the history of the trade they established, but with that of the region itself from the time it was a wilderness till it became a populous and important portion of the United States. To this day the name commands respect among all the Indian tribes north and west. The vast Indian territories bordering the great tributaries of the Missouri and the Mississippi opened a boundless and almost unexplored field for the operations of the fur traders. Hostile tribes were often encountered, but none long checked their enterprise. The Rocky mountains served only for a time as a barrier to their explorations, their trading posts, before 10 years of the present century had elapsed, being established on Lewis and Columbia rivers. No other business was conducted throughout these regions but what was connected directly with the fur trade; agriculture and all the other resources of the country were neglected for this exciting and adventurous occupation. The furs, collected by long and tedious navigation in canoes and Mackinaw boats from the most distant sources, were run down the dangerous rapids of the streams, and laboriously packed upon the backs of men over the portages around falls, and past the shoals which the hardest voyageurs might not navigate. Their market was then reached by another voyage of several months to New Orleans, where they were exchanged for a return freight of groceries; or in the other direction to the great trading post of Mackinaw,

whence the voyageurs came back with English goods, the returns from England in fact for furs taken to Mackinaw 4 years previously, and then boated down the lakes and the St. Lawrence to Quebec. The annual cost of the goods in the early years of the trade was about \$35,000. This was doubled by the expenses of transportation from Mackinaw; but the profits were nevertheless rated at 800 per cent. During the last 10 or 15 years of the 18th century the value of the goods annually sent up the Missouri in exchange for furs was estimated to average \$61,000. Little money was seen in these transactions; the currency was shaved deer skins. The average annual value of the furs collected at St. Louis for 15 successive years, ending in 1804, is stated to have been \$203,750. The number of deer skins was 158,000; beaver, 36,900 pounds; otter, 8,000; bear, 3,100 skins; and buffalo, which is now by far the most important fur, only 850. The Missouri fur company was founded in St. Louis in 1808, consisting of the Chouteaus and several new associates. By this association an expedition was sent across the Rocky mountains under Major A. Henry, and the first post established on the Columbia river. The company was dissolved in 1812, and new associations of its members were formed the same year for continuing the trade independently of each other; but their operations were rarely extended beyond the Rocky mountains. This trade in connection with St. Louis was not renewed until the expeditions of Gen. W. H. Ashley in 1823 and 1824, who by extraordinary enterprise and perseverance succeeded in bringing to St. Louis, between 1824 and 1827, furs to the value of \$180,000. He then sold out to the Rocky mountain fur company of St. Louis, and this association conducted for several years an extensive business, their parties running over nearly the whole of California and all the country about the southern branches of the Columbia. The dangers to which they were exposed from Indians and accidents were so serious, that  $\frac{2}{3}$  of all the men employed from 1825 to 1830 lost their lives in the service. The other traders of St. Louis during this time were united for 6 years in the firm of B. Pratte and co., excepting the western department of the American fur company, a branch of his house which Mr. Astor of New York established in 1819 in St. Louis. His gigantic operations of an earlier date will be presently noticed. In 1834 this department, on the retirement of Mr. Astor from business, was sold to Messrs. B. Pratte, Pierre Chouteau, jr., and Cabanné of St. Louis, who conducted the business till 1839, when the still existing organization of P. Chouteau, jr., and co. was formed. For 40 years preceding 1847 the annual value of the trade to St. Louis is supposed to have been between \$200,000 and \$300,000, and the latter half of this term much more than the larger sum named; but it was of still greater importance in developing the resources of the wild territories west of the Mississippi, and opening these to the settlement of civi-



ilized races.—Of the eastern merchants engaged in this trade, the most prominent was Mr. John Jacob Astor, who embarked in it in 1784, at the same time making his residence in New York. He was a purchaser of furs in Montreal, which until the treaty of 1794 or 1795 could be taken only to England for sale. Afterward he introduced them into New York, whence he shipped them to different parts of Europe and to China, his ships bringing from the latter in exchange the rich products of the East. About the year 1807 he engaged in the trade on the northern frontier, competing with the wealthy companies of Canada that had long occupied this field. His projects were directed to an object of great national importance, long desired by the government of the United States, but in which it could take no direct action, viz., the diversion of this great trade from foreign companies to the benefit of our own commerce and the increase of its revenues. In 1808 he obtained from the New York legislature a charter for the "American Fur Company," with a capital of \$1,000,000, and the privilege of increasing it to \$2,000,000. The capital he furnished himself, but preferred to act under the name of a corporation. In 1811 this corporation was merged, on the buying out of the Mackinaw company of Canada, in another called the "South-west Company." In 1809 Mr. Astor gave his attention to the project, suggested many years before by Sir Alexander Mackenzie especially for the benefit of the British companies, of establishing a line of communication across the continent from the Atlantic to the Pacific ocean, and concentrating in one operation the entire fur trade on both coasts, to the territories already occupied by the Hudson's bay company on the north and the Russians on the north-west. He sought an association with the north-west company of Canada, to whom he could offer a means of shipment of furs from the Pacific coast to China, a privilege which was monopolized in British territory by the Hudson's bay company. The north-west company declined the proposed association, and sought to anticipate Mr. Astor in effecting a settlement at the mouth of the Columbia. Some of its late officers, however, became associated with Mr. Astor in June, 1810, and a company was formed styled the "Pacific Fur Company." An expedition was forthwith sent round by sea to the mouth of the Columbia, and another was organized to proceed from Montreal to Mackinaw, thence to St. Louis and up the Missouri, on the way across the continent to the same destination. One of the party which went by sea was Mr. Gabriel Franchere, who is still engaged in the fur trade in New York, and whose published narrative is the chief historical record of these important expeditions. The land party was accompanied by Mr. Ramsay Crooks, a young Scotchman, who returned by land in 1818, and afterward became distinguished as a partner and successor of Mr. Astor in the trade, continuing in it till his death in 1859. Each year similar expeditions were to be despatch-

ed at the expense of Mr. Astor, his associates devoting themselves to the enterprise, and receiving half the shares. Mr. Astor nobly performed his part of the scheme, for 3 successive years despatching a ship to the support of the colony with instructions to trade for furs upon the coast, and proceed with them and what were collected at the mouth of the Columbia to China, returning with India goods to New York. He anticipated years of outlay, and by his articles of agreement was bound to furnish funds to the amount of \$400,000. A succession of misfortunes attended the enterprise; but Mr. Astor was not disheartened, and through his courage and support it would no doubt have resulted in complete success, but for the treachery of his principal Canadian partner, who, under the pretence that the property on the Pacific must be seized by the British cruisers during the war, disposed of it all for a mere nominal price to the rival north-west fur company, and associating himself with them, transferred the settlements to the protection of the British flag, Oct. 16, 1813. The operations of Mr. Astor were after this limited to the country on this side of the Rocky mountains, his principal establishment being at Mackinaw. Before Lake Superior became known in 1844 for its copper mines, it was visited only by those connected either with the reorganized American fur company, which maintained an establishment at its outlet, and supported a brig named the Astor upon the lake; or by those belonging to the Hudson's bay company; or by parties in the employment, as soldiers or otherwise, of one of the two governments. Up to 1848 the fur trade was the sole business interest of the territory of Minnesota. The trading posts of St. Paul and Mendota controlled the neighboring territories of the Winnebagoes and Chippewas, of the Sioux and the Dakotas; but since 1852 the decline of the business has left the great fur company of Pierre Chouteau, jr., and co. no inducement to continue their operations, and the reduced trade is now conducted by smaller houses, composed, however, of some of the old fur traders. The trade is limited almost entirely to the Pembina or Red river region, and that around the head waters of the Mississippi, and the St. Peter's or Minnesota. The exports of furs from St. Paul in 1856 were as follows:

Animals.	No. skins.	Value.
Muskrat .....	64,292	\$11,572 56
Mink .....	8,276	18,691 00
Marten .....	1,428	8,570 00
Fisher .....	1,045	4,702 50
Fox, red .....	876	1,095 00
" cross .....	20	100 00
" silver .....	8	400 00
" kitt .....	2,542	1,271 00
Raccoon .....	2,400	2,550 00
Wolverine .....	2,082	3,043 00
Otter .....	405	1,417 50
Beaver, lbs. ....	586	881 00
Bear .....	610	6,700 00
Lynx .....	50	125 00
Buffalo robes .....	7,500	41,200 00
Total value .....		\$97,253 56

In 1857 the total value of the furs was \$182,491, and in 1858 \$161,022, the decrease in 1858 being the result not of reduced quantity but of lower prices of furs. St. Paul is becoming a great depot and outlet for the fur trade. Prior to 1844 the entire fur product of the Red river valley, north and south of the British boundary, was collected by the agents of the Hudson's bay company, and sought the seaboard through Nelson's river and Hudson's bay. In 1844 an effort was made from St. Paul to get the furs of the Red river valley. The first year only \$1,400 worth came that way; in 1856 the value amounted to \$75,000. From Pembina, in 1857, there were received at St. Paul \$120,000 worth of furs.

The variety of furs in use and the importance of the trade are well exhibited in the following table of the importations and exportations of the English market in 1851, and of the importations in 1855-'6. The number of skins imported in 1851 was estimated at about 5,000,000. The omission of buffalo (bison) robes will not fail to be noticed. These, which constitute the largest item of the domestic trade in furs of the United States, being annually procured from the western territories to the amount of more than 100,000 skins, do not reach the English market, and are rarely exported to Europe. In the Crimean war they were sent there in some quantity to be used in the tents of the soldiers.

Animals.	1851.			Importations from Sep. 1, 1855, to Sep. 1, '56.		
	Total Imp't'd into England.	Exported.	Consumed in England.	By Hudson's Bay Company.	From the U. States.	Total.
Raccoon .....	525,000	525,000	.....	1,794	493,401	440,195
Beaver .....	60,000	12,000	48,000	70,915	11,594	82,509
Chinchilla .....	85,000	80,000	50,000	.....	.....	.....
Bear .....	9,500	8,000	1,500	Black.. 7,316	3,804	10,539
Fisher .....	11,000	11,000	.....	Gray.. 892	29	999
Fox, red .....	50,000	50,000	.....	Brown. 1,226	.....	1,235
" cross .....	4,500	4,500	.....	.....	2,827	8,014
" silver .....	1,000	1,000	.....	.....	26,831	34,327
" white .....	1,500	500	1,000	.....	2,153	4,067
" gray .....	20,000	18,000	2,000	.....	896	1,001
" kit .....	.....	.....	.....	.....	10,590	13,190
Lynx .....	55,000	50,000	5,000	.....	29,589	29,589
Marten .....	120,000	15,000	105,000	8,370	1,774	5,144
" stone and pine .....	120,000	5,000	115,000	11,344	1,555	12,899
Mink .....	245,000	75,000	170,000	179,280	16,082	195,342
Kolinskii .....	58,416	200	58,210	61,510	69,294	120,504
Ermine .....	187,104	.....	187,104	.....	.....	.....
Muskox .....	1,000,000	150,000	850,000	258,790	309,480	1,168,270
Otter .....	17,500	17,500	.....	15,064	5,181	20,193
Sea otter .....	100	100	.....	.....	.....	.....
Seal, fur .....	15,000	12,500	2,500	.....	.....	.....
Wolf .....	15,000	15,000	.....	.....	.....	.....
Squirrel .....	3,000,000	100,000	2,900,000	7,563	98	7,666
Fitch .....	65,091	23,276	36,815	.....	.....	.....
Rabbit .....	120,000	.....	120,000	Opossum .....	83,817	83,817
Wolverine .....	1,200	1,200	.....	.....	10	1,141
Skunk .....	1,200	1,200	.....	11,318	487	11,805
Wild cat .....	.....	.....	.....	500	8,823	9,323

The skins of the raccoon (*procyon lotor*) are obtained from the American continent; they are finally sent to Germany and Russia, where, on account of their durability and cheapness, they are in demand for linings for coats, &c. The fur of the beaver (*castor Americanus*) was formerly highly prized in the manufacture of hats, and it made a considerable portion of the profits of the fur companies. It constituted the largest item in value among furs. In 1839 a single skin was worth in London 27s. 6d.; in 1846, 3s. 5d. In the former year 55,486 skins sold for £76,312; in the latter year 45,389 skins sold for £7,856. Cheaper materials had been substituted in making hats, and the demand had nearly ceased. By a new process the skin is now prepared to make a handsome fur for collars and gauntlets, and its fine silky wool has also been successfully worn. The white wool from the belly of the animal is still largely used in France for bonnets. The chinchilla (*chinchilla lanigera*) is an animal intermediate between the squirrel and the rabbit. It inhabits South American countries;

those producing the darkest and best colored skins (which are a silvery gray) are found among the Chilian Andes and in Arica. The fur is soft and delicate, and is principally consumed in France, Germany, and Russia. Bear skins, included in peltry, are of various sorts. The skins of the black bear (*ursus Americanus*) and grisly bear (*U. horribilis*) are used for military caps, housings, holsters, sleigh robes, &c.; the fur of the brown bear (*U. Isabellinus*) for articles of ladies' dress. The fisher is a North American animal of larger size than the sable, with longer and fuller fur. The most valuable of the fox skins are those of the black or silver fox. The latter are occasionally obtained in the country bordering Lake Superior, and are there valued at more than \$50 apiece. When highly dressed they are worth in the European markets from 10 to 40 guineas each. They are bought principally for the Russian and Chinese markets. The white fox (*vulpes lagopus*) is very abundant in the arctic regions. The skins of the red fox are purchased by the Chinese, Persians, Greeks, &c., and made into linings for robes, &c. They are

ornamented with the black fur of the paws, which is set on in spots or waves. The fiery fox is an Asiatic species of a brilliant red color and very fine fur. It is the standard of value on the N. E. coast of Asia. At the Leipsic fair it is known as the Podolian fox. The lynx includes the Canada lynx and the lynx cat (*felis Canadensis* and *F. rufa*). The fur is soft, warm, and light, naturally of a grayish color, with dark spots, but commonly dyed a beautiful shining black. It is used for facings and linings of cloaks, for the most part in America, brought back from England. Several species, or at least varieties, of marten or sable produce the fur which is commonly known by the latter name. The most valuable is the crown or Russian, the skin of the *mustela sibirica*, the use of which in Russia is monopolized by the imperial family and nobility. The darker varieties have sold for £9 each, but their average value does not exceed £2 or £3. The use of this fur in the time of Henry VIII. was restricted to those above the rank of viscount. The lining of a robe of state, if made of the finest sables, is stated to cost sometimes 1,000 guineas. The best skins are obtained in Yakootsk, Kamtchatka, and Russian Lapland. Only about 25,000 are annually procured, and but few of them reach the English market. Some are brought every year by Jewish traders to the fair at Leipsic, obtained privately from Siberia. In 1855 many choice furs were received in New York from the Russian American company at Sitka, it being thought more prudent to send them there than to risk their reaching St. Petersburg. Among the packages was a camphor wood box of about 3 feet in length, bearing the stamp of the Russian government, and containing 400 small skins, which were valued at \$14,000. The highest prized were those almost black, which were rated at \$51 or \$52 each. A cape of full size would require from 16 to 18 of these skins. The Hudson's bay sable were rated in 1856 at about \$25 per skin. The fur of the tails is an excellent material for the fine pencils or brushes used by artists. The Hudson's bay sable is generally considered another species, and is named *M. Canadensis*. The fur is commonly dyed a darker color than that natural to the animal. The chief demand for this fur is in England, France, and Germany. The baum or pine marten (*M. abietum*) and the stone marten (*M. saxorum*) are European sables, the former living in wild districts, the latter often near the habitations of man. The fur of the latter is much used by the French, who excel in dyeing it, and it is hence often known as French sable. The minx or mink (*M. vison*) is of the same genus with the other sables; the fur is largely obtained in North America, and is sometimes passed off as real Russian sable. The Kolinski is an inferior Russian or Tartar sable; the tail affords the best hairs for artists' pencils. The choicest fur of the sables is that of the ermine (*M. erminea*). This is a small animal only 10 or 12 inches in length, much resembling the common weasel, but differing from it in its

fur changing from a dingy brown to a pure white in the winter season in the cold regions of Russia, Sweden, and Norway, where alone it is found. The lower part of the tail is shining jet black, and this is commonly introduced as an ornament to the white fur, being inserted at intervals. The paws of the black Astrakhan lamb are often substituted for the tail of the ermine. This fur, called *minever* in heraldry, has been the royal fur of several European nations. Its use was restricted to the royal family of England by Edward III. At present it may be worn by any one; the modes of ornamenting it, however, as it is worn on state occasions, serve still to distinguish the sovereign and the rank of the peers, peeresses, judges, &c. Only the robes of the royal family can be trimmed with ermine thickly spotted with the black paws of the Astrakhan lamb. The use of the ermine fur is restricted in Austria to the imperial family; and it also distinguishes the sovereigns of Germany, Spain, Portugal, and Russia. The muskrat or musquash (*fiber sibiricus*) is a common inhabitant of the banks of our streams, in the most remote districts of the mountains, as well as in the cultivated meadows around our villages. The fur is principally used by the hatters, who pay a small price for the skins. It is also dressed and used for the other uses of fur. The skins of the otter (*utra vulgaris*, *L. Canadensis*) make a beautiful and warm fur, which is much valued, especially by the Russians, Greeks, and Chinese. It is for the most part an American product; but it is also procured to some extent in the British isles from a smaller variety of the species. Another small variety with short fur is also found in the East Indies. The sea otter (*enhydra marina*) is found in the north Pacific ocean, on the Asiatic and American coasts. Its habits resemble those of the seal. The Russians and Chinese highly esteem its fur, and it is said that its use in China is restricted to the emperor, mandarins, and officers of state. It was first introduced into commerce in 1725, and in 1780 it was in great demand in China, and commanded such prices, from \$30 to \$100 a skin, that several American and British expeditions were set on foot to obtain the furs on the northern islands of the Pacific, about Nootka sound, &c. Many varieties of the seal (*phoca*) furnish useful furs. The large supplies are from the coasts of cold countries. The fine silky and curly yellow down of this animal is disfigured in the natural state by long coarse hairs which grow through it, and are rooted deep in the pelt. These are removed by splitting the skins with a sharp blade between the roots of the two kinds of hair; the same effect occurs by a process of fermentation. The fur is usually dyed a deep brown color, and then resembles in its softness the richest velvet. Wolf skins are of little value for fur; they serve for sleigh robes and such purposes. The squirrel (*sciurus vulgaris*), though diminutive in size, furnishes a vast amount of fur. The animal is found of many varieties in cold countries, and

the number of them destroyed is almost incredible. In Russia alone it is estimated that about 23,000,000 skins are annually obtained. The most valuable portion is the back of the gray squirrel; the white portion covering the belly is also highly prized, especially for cloak linings. The Weisenfels lining, weighing only 25 ounces, will cover a full-sized cloak. The tails are made into boas, and the hairs into artists' brushes. The fitch is the European polecat (*mustela putorius*). Its fur is perhaps more used in this country than in those to which it is indigenous. The various species of the rabbit and the hare furnish much fur that is used in making felt; and the skins of some of them are sufficiently strong to be dressed for linings, those of the Polish rabbit being now no mean substitute for ermine. The silver gray rabbit was formerly known only in Lincolnshire, England, but the breed is now raised in warrens in various parts of England, and the fur is exported to China and Russia, where it is much valued, though thought little of in its own country. The business of breeding rabbits for their fur has been introduced into the United States, and large numbers of them were raised not long since in warrens near Danbury, Conn. The nutria or coypou (*myopotamus coypus*), not included in the above table, formerly supplied large quantities of fur for hats, as many as 600,000 skins being exported to Great Britain annually from Buenos Ayres and Chili. The supply has now fallen off, and the few skins obtained are dressed as a substitute for the more costly fur seal. The fur of the North American wolverine or glutton (*gulo luscus*) finds a market for the most part in Germany, where it is used for cloak linings, &c. The skins of the skunk (*mephitis americana*) are annually exported from New York to the amount of many thousands, and from England they are reshipped to the continent. They are worth from 50 to 67 cts. apiece, the black ones being most esteemed. Valuable furs are supplied from many other animals beside those enumerated, as the badger, whose long wiry hairs are also used for shaving brushes. The domestic cat is bred in Holland for its fur, and the skins are merchantable in the United States, being worth from 10 to 50 cts. each; kittens 6 to 8 cts. Mention has been made of the paws of the black Astrakhan lamb. This animal is covered with the most rich and glossy silk-like fur, all the more delicate, it is said, when obtained, as is not unusual, by slaughtering the mother before the birth of the lamb. The fur of the Persian gray and black lambs is made the better to retain its curliness by the practice of sewing the animal tightly in leather immediately after its birth. The furs of the leopard, tiger, lion, &c., find uses as sleigh robes, mats, &c.—Notwithstanding the increasing scarcity of furs, what is called the fancy fur trade, being that in furs used principally for the dresses of ladies, and exclusive of hatters' furs and buffalo robes, is of growing importance in the United States. The wholesale and retail trade of the city of New York for the year 1856 was estimated at about

\$1,875,000. The increased demand was mostly for the skins of the mink and opossum, the effect of which has been to raise the price of the former from its old rate of from 30 to 50 cents each to from \$3 50 to \$4. Among the publications relating to furs and the fur trade may be mentioned a paper of Mr. Aiken, published in the "Transactions of the Society for the Encouragement of Arts, Manufactures, and Commerce" (London, 1830); Irving's "Astoria;" an article in the "American Journal of Science" (vol. xxv., 1834); and a "Report of the Celebration of the Anniversary of the Founding of St. Louis on the 15th day of February, A. D. 1847."—FUR-DRESSING. As skins are sent to market they have been commonly merely dried in the sun or by a fire; or possibly the small skins may have been first steeped in a solution of alum. The object is to render the pelt perfectly dry, so that when packed it shall not be liable to putrefy. When stored in large quantities the skins are carefully protected from dampness, and to secure them from injury by moths, they are strewed with camphor, and every few weeks are overhauled, and each skin beaten with a stick. This causes the worms of the moth to fall upon the floor, where they are immediately crushed. As the fur-dresser receives the skins he causes them to be subjected to different processes according to the kind of fur and the object for which it is intended. The fine qualities for ornamental dresses are usually placed in tubs together with a quantity of rancid butter, and are then trampled upon by the feet of men. The pelt thus becomes softened, as if partially tanned. They are next cleaned of the loose bits of integument by rubbing them with a strip of iron. The grease is then removed by trampling them again with a mixture of sawdust—that of mahogany is preferred—and occasionally beating them, and combing the fur. This is all that is necessary to prepare them for the cutter, whose office it is to cut out the variously shaped pieces, and sew them together to make the different articles. The cutting requires much skill to avoid waste. From a great number of similar skins parts of the same shades of color are selected, and thus each muff, mantle, or other article is made to present a uniform color. The seams are concealed by the lining with which the furs are finished.—Furs intended for felting, as the sorts used in hat making, are differently prepared. Hare skins are split open, then rubbed with a jagged knife blade called a rake to remove bits of fleshy matter adhering to the pelt. They are then damped on the pelt side with water, and being placed together in pairs, pelt to pelt, are pressed. They are thus made smooth and ready for shearing, an operation by which the long coarse hairs are clipped close down to the fur. The angular projections and edges of the pelt are then trimmed off, a process called rounding. The next operation is cutting off the fur. This is performed with broad knives, made it may be of sheet iron or of steel, frequently sharpened to a rough edge by rubbing them

upon a coarse whetstone. The skins are held upon a cutting board made of willow wood, and kept moistened with water, and the knife, applied first at the cheeks of the skin, is run rapidly forward and backward, steadily removing the fur as it progresses toward the tail. An instrument of tin is held in the left hand against the knife, and by means of this the fur is gathered up and kept in one fleece. By the old method the skins were split down the back, dividing them into halves, and in cutting one of these the left hand served without any instrument to press the knife forward and gather the fur in, being lifted for the purpose with every 2 or 3 strokes. Rabbit skins are treated in a similar way, except that the long hairs, instead of being clipped, are pulled by catching each one between a knife blade and the thumb, this being protected by a leather covering. Beaver and nutria skins require more care to remove the fatty and fleshy matters, and to cleanse them from grease, all which must be done before the long hairs are pulled. Nutria skins especially are loaded with fat upon the pelt, and the fur is filled with grease. Scrubbing with a brush and free use of soap and boiling water are necessary to remove the latter. The fur of beaver skins is cut by machines, which have been successfully applied to this thick kind of pelt; but the unevenness of other sorts prevents their application to these. Attempts have been made to remove the fur by chemical ingredients, but the effect of these has usually been to impair the felting property. But the application of dilute sulphuric acid to the fur before it is removed from the pelt is found to improve this property, probably by its destroying the last traces of the grease. Skins that have been wetted with it are said to be carotized, from the color it imparts; they should be immediately dried by exposure to the heat of a fire, or by smoothing with a hot iron and drying in the sun. Rabbit and hare skins by long keeping are very liable to suffer injury from moths and other insects, and the former, especially if kept in large heaps, from the running of the greasy matter among them, and becoming rancid, corroding the pelt itself. In England it is found that the strongest rabbit fur for felting is obtained from animals bred near the sea, particularly along the coast of Lincolnshire and Berwick and the intermediate coast. The skins taken in the winter are far superior in quality to those obtained at other times, and are distinguished in the trade as seasoned, all others being called unseasoned.—For further information in this department of the fur manufacture see FELT, and HAT.

**FUREEDPOOR**, or **DACCA JELALPOOR**, a district of British India, presidency of Bengal, bounded N. by Mynumsing, E. by Dacca, S. by Backergunge, and W. by Jessore and Pubna; area, 2,052 sq. m.; pop. 855,000. It is wholly alluvial, and in the S. and N. E. parts, where the land is low and marshy, is subject to frequent inundations, but the N. and N. W. are more elevated, and have a rich, deep soil. The Ganges

touches the W. frontier at Juffergunge, and receives an offset of the Konaie, by which its volume is more than doubled; 15 m. below it enters the district, which it waters for 60 m. of its course, sending off near the E. frontier a branch called the Kirtynassa, which connects it with the Brahmapootra. The principal productions of the district are the sugar cane, cotton, indigo, oil seeds, and rice. Among the manufactures are indigo, sugar, rum, and coarse cotton cloths for domestic use. Fureedpoor, Hobbigunge, and Juffergunge are the chief towns. The district was acquired by a grant from the emperor Shah Alüm in 1765.—**FUREEDPOOR**, the capital of the above district, is a straggling town on the right bank of the Ganges, here called the Podda, 115 m. N. E. from Calcutta. It was formerly notorious as a resort of river pirates, but since the establishment of the government officers at this place the evil has been abated.

**FURETIÈRE**, **ANTOINE**, a French author chiefly known for his controversy with the academy, born in Paris in 1620, died May 14, 1688. He was successively an advocate, a fiscal agent, an abbé, and a prior, and was admitted into the French academy in 1669. While the academy was preparing its dictionary, Furetière, regarding the work as defective, determined to edit and publish a lexicon on his own account. Hence the academy excluded him, and a war of epigrams, satires, and libels, unsurpassed for violence, began between him and the leading academicians. Furetière was protected by the most important personages, by Racine, Boileau, Molière, Bossuet, and even Louis XIV., and his wit and vivacity distinguished him in society; but his death occurred before the suit which he prosecuted against the academy was decided. His dictionary, enlarged by Basnage, passed through several editions. He wrote also a few fables and poems.

**FURIES**. See **EUMENIDES**.

**FURLONG** (Sax. *far* or *fur* and *long*), an old English measure of 40 poles, equivalent to  $\frac{1}{4}$  of a mile. In Ireland it is 0.15 of a mile, and in Scotland 0.1409. In the United States the measure is not in use. As a superficial measure, a furlong in Great Britain is generally 10 acres, according to the acre of different counties; but it was formerly used for a piece of land of no particular dimensions.

**FURNACE** (Lat. *foras*), a structure containing a fireplace, intended for maintaining intense heat. It differs from a kiln, which is used for purposes requiring lower degrees of heat, the one being contrived to effect rapid combustion, and the other to sustain a slowly consuming fire. In many of the useful arts the first requisite is the means of obtaining a very high temperature. In all metallurgic operations, the object of which is the reduction of the ores and treatment of the metals, and in almost every art involving the use of fire, a furnace of some kind for producing this heat is in demand. The ancient Greeks employed furnaces for casting statues of bronze; Homer makes mention of a

blast furnace with 20 crucibles (II. xviii. 470). The Egyptians are known to have made use of melting pots, but we have no knowledge of their furnaces. An ancient smelting furnace was discovered near Arles, in southern France, which was shaped like an inverted bell, having under the surface of the ground a channel for the discharge of the melted metal. Strabo speaks of furnaces built in Spain, which were raised to a great height for conveying off the noxious fumes. They were also furnished with long flues and chambers made for collecting the oxides and other sublimed matters. The forms and dimensions of modern furnaces vary greatly according to the different purposes they are designed to serve. The iron manufacturer, smelting the ores upon the vast scale upon which his business is conducted, builds an immense structure with a capacity of hundreds of tons, and furnishes it with heavy machinery for supplying the great volume of air blown in almost without ceasing, as the operation is continued during a single "blast" of two years or more. But the furnace which first tries his ores and determines their properties, in order to guide the workings of the great establishment, may be but a small vessel of refractory material, heated in the laboratory by a gas flame, made more intense by its mixture with a current of atmospheric air. (See BLOWPIPE.) In the article COPPER SMELTING, reference has been made to the peculiar furnaces employed in this operation; and those made use of in the treatment of iron ores will be described in the article upon that metal. Other furnaces also will be found noticed in the accounts of the arts to which they belong, and those for warming buildings in the article on WARMING AND VENTILATION.—All furnaces employed in melting refractory materials—those for assaying, as well as those operating upon a large scale—require a free supply of air, proportional in quantity to the amount of fuel they consume. The generation of heat depends upon the rapid chemical combination of carbon with oxygen, and a sufficient supply of the latter element is as essential as is that of the former. Every pound of good bituminous coal, according to Dr. Thomson, requires 150 cubic feet of air, or, allowing  $\frac{1}{2}$  more for waste, there should be supplied at least 200 cubic feet. So immense is the quantity of this invisible element consumed and wasted in the large furnaces for smelting iron ores, that its weight even is greater than that of all the other materials, ores, coal, and flux, introduced; and the power required to force this volume of air through the dense column of heated matters far exceeds that expended in charging the furnace with its solid contents, even adding to this the power involved in the removal of the products of the operation. To provide for this large supply is then a matter of the first consequence to furnaces; and according to the mode in which this is effected they are separated into two classes. The kind called air or wind or reverberatory furnaces receive their supply by means of the

current produced by a tall chimney, the heated column rushing upward through the flue, as a Montgolfier balloon rises when the air within it is rarefied and rendered specifically lighter by heat. (See CHIMNEY.) To fill the space in the lower part of the flue, air presses in from without through every aperture; and none being allowed except those leading through the receptacle for the fuel, the supply of air is thus secured, heat is generated for the purposes required, and a portion is expended in furnishing the mechanical power involved in the movement of the current of air. Our fireplaces, stoves, and grates are examples of air furnaces; and by means of the blower, which causes the air admitted into the chimney to pass first through the fire, the flue is prevented from becoming chilled by the entrance of cold air, the column ascends more rapidly, an increased supply of air is furnished to every portion of the body of fuel, and the chemical process goes on with augmented intensity and generation of heat. The other classes of furnaces are supplied with air through bellows or other blowing apparatus. (See BLOWING MACHINES.) They are called for this reason blast furnaces, and are used when the resistance opposed to the passage of the current of air by the density of the contents of the furnace is so great, that sufficient quantity cannot penetrate to keep up thorough combustion throughout the mass; or when the operations do not admit of the large openings beneath the fire, which the free admission of such bodies of air would require; or again, when the nature of the operation demands an intensity of heat concentrated in one spot. The blast in this case acts like the jet of the blowpipe, and its effect is in many cases greatly increased by its being conveyed through iron pipes which are highly heated by exposure in suitable ovens to the waste heat of the smoke and gases which escape from the chimney. It thus returns to the interior of the furnace, in the form of highly heated air, a portion of the caloric that would otherwise be lost. Furnaces of both classes are often used in the chemical laboratory. The one commonly employed for general purposes is a wind furnace, built of fire brick, and strongly secured with iron rods and straps. It has a flat top, with two or more openings, and on these are placed pans of cast iron, one exposing a surface of 2 to 8 feet square running over the flue. This contains the sand in which vessels are placed for exposure to moderate heat. The other is a deeper pan or rather pot, also partially filled with sand, in which retorts and other vessels may be subjected to more intense heat. The furnace has under the flue that leads into the chimney an oven for drying. With a good draught this furnace produces sufficient heat for many crucible operations. These are, however, better conducted in smaller furnaces, either wind or blast, constructed specially for this use. Dr. Faraday contrived a very simple one of the latter class, which he used in the laboratory of the royal institution. He employed two blue-

pots or plumbago crucibles, one 18 inches high and 18 inches diameter at top, and another introduced into this as a lining,  $7\frac{1}{4}$  inches diameter inside, from which the bottom had been removed, leaving an opening of 5 inches. A space was left between the two pots at top, which he filled and packed with powdered glass-blowers' pots, moistened with water. A round iron grate was then set near the bottom of the inner pot, and a hole to receive exactly the nozzle of a double bellows was drilled at the base of the outer one through this into the space beneath the grate. By blowing in air the fire of coke upon the grate was made to burn with great intensity, so that pieces of bar iron could be melted in crucibles within 15 minutes. A wind furnace of great power adapted for crucible operations and cupelling also, referred to at the close of the article DENTISTRY, was contrived and manufactured by Dr. E. A. L. Roberts of New York, originally only for processes connected with the making of mineral teeth. The portion above the grates is formed of slabs of fire brick shaped for the purpose, one for each side, and one for the top. When put together they form a truncated pyramidal figure, whose greatest inside capacity is  $12 \times 14$  inches. Suitable openings are left in these, one in the top for the smoke flue, one in the side for supplying fuel, which is closed with a fire brick plug, and in the larger furnaces 3 in front, one just above the grates and 2 above this for muffles. The upper 2 are used for annealing and for partial baking. The smaller furnaces have but one opening for muffles. These are made of the form of a triangular prism, with the corners rounded and made thicker than in the ordinary muffles, these being the weak points that usually first give out. The whole is strongly bound with iron. The base of the furnace is a cast iron box, open at top, with a horizontal flange projecting like the rim of a hat on the two opposite sides, upon which the upper portion is set. Two grates are laid in the top of the cast iron box, supported on pivots at the outer corners, so that each may, when desired, be dropped flat against its side of the box. Along a line from front to back through the middle of the furnace is fixed a turning bar, which supports the inner edges of the two grates at such a height that each slopes from the outer edge toward the centre at an angle of about  $80^\circ$  with the horizon. By turning the bar the grates may be made to discharge a part or the whole of the ashes and cinders. The front and back fire brick plates of the upper portion are shaped to fit the slopes of the grates. Under the grates are the usual doors for admitting air and affording access to remove the ashes. In baking mineral teeth, a process requiring intense white heat, it is found that with this furnace an effect may be obtained in 15 minutes which requires from 20 to 25 minutes by the ordinary furnaces.

FURNESS, WILLIAM HENRY, D.D., an American clergyman and author, born in Boston,

Mass., April 20, 1802. He studied at the Boston Latin school, was graduated at Harvard college in 1820, completed his theological course at Cambridge in 1823, and was ordained pastor of the First Congregational Unitarian church in Philadelphia in Jan. 1825. One of his constant labors as a preacher and author has been to ascertain the historical truth and develop the spiritual ideas of the records of the life of Christ. To this end he has published "Remarks on the Four Gospels" (Philadelphia, 1836; London, 1836 and 1851); "Jesus and his Biographers" (8vo., Philadelphia, 1838); a "History of Jesus" (1850; new ed., Boston, 1853); and "Thoughts on the Life and Character of Jesus of Nazareth" (Boston, 1859). These works reveal a highly cultivated intellect, impelled by enthusiastic ardor and enriched by a glowing fancy, and present a peculiar humanitarian view of the character of Christ. "Æsthetic considerations," says a writer of his own denomination, "weigh more with him than historical proofs, and vividness of conception than demonstration." Dr. Furness has published a volume of prayers, entitled "Domestic Worship" (2d ed., Boston, 1850), and a volume of discourses (Philadelphia, 1855). He has also written hymns and other devotional pieces in verse, and has made exquisite translations from the German, among which are the "Mirror of Nature" from Schubert, the "Song of the Bell" from Schiller, a volume of "Gems of German Verse," an enlarged edition of which is now (Aug. 1859) in the press, and a volume entitled "Julius, and other Tales, from the German" (Philadelphia, 1856). He edited for 8 years the "Diadem," a Philadelphia annual, has contributed a few articles to the "Christian Examiner" of Boston, and is the author of a large number of published occasional sermons, many of which are in support of the anti-slavery movement, in which he takes deep interest. His latest published discourse (1859) is on the "Right of Property in Man." He is the pastor of a large and intelligent society, and as a preacher is eminent for the earnest and eloquent presentation of his individual convictions.

FURNITURE, articles and utensils used in housekeeping. As in all countries wood is the chief material employed for furniture, we are necessarily destitute of ancient examples, and for remote times are obliged to rely on the representations given by monuments still extant. The ancient Egyptians, in the arrangements of their rooms and the character of the furniture, studied variety; neither the windows, doors, nor wings of a house exactly corresponded with each other. They sat on chairs like Europeans, and the great variety and elegance of these articles is remarkable; they were formed of ebony and other rare woods, often inlaid with ivory and gold and covered with costly tissues. Stools and low seats were also used; settees on the principle of the modern camp stool were found in every house, the folding seat covered with the skin of a leopard; the seats of chairs



were also frequently made of interlaced thongs or strings, exactly similar to our Indian cane chairs. Carpets were in use; a single specimen indeed exists—a small rug made with woollen threads on linen strings, with ornaments in blue and red on a yellow ground. Square sofas, or ottomans, with leathern cushions and painted bases, and elegant couches with one end raised and receding in a graceful curve, the feet fashioned to resemble those of a wild animal, were also among the usual fittings of a room. The tables were round, square, or oblong, those of the first shape being often supported by a single shaft or leg in the centre carved to represent a human captive. Of their bedroom furniture we have little knowledge. They seem to have used a kind of wicker bedstead of palm branches, not unlike the framework on which their descendants at the present day rest their mattresses and divans, and the wealthier classes also used bedsteads of iron, and perhaps of bronze. They had mirrors of burnished metal, chiefly of copper, with ornamented handles. It is uncertain of what material they made their lamps. The flame was sustained by a floating wick, and fed with salt and oil. Among the kitchen utensils were caldrons for boiling meat, tripods and metal frames for supporting them over the fire, bellows worked by the feet, siphons for drawing off liquids, and a stand or table equivalent to the modern dresser. Neither knives nor forks were used in eating, but spoons and ladles were employed, and the large joints of meat may have been carved with a knife. The great variety of vases of different material in every house served both for use and ornament. Those intended for the former were of glazed earthenware or vitrified pottery, often of elegant design; but in the richer specimens intended for sacred purposes or as purely decorative objects, the most costly materials were employed. They were of gold or silver, alabaster, porcelain, or richly colored glass, the last with elaborate patterns fused together, in a manner which the skill of modern glass workers is insufficient to explain. The thousand little elegances testifying to the benign effect of female presence were always to be found in Egyptian rooms, as their women were not secluded, but mingled freely in the dinner parties and reunions that were a prominent feature of the social arrangements of the people. In short, "hushed old Egypt" was a land where great comfort and luxury were enjoyed, and there is scarcely an article of our daily use that cannot be paralleled by an example (in most cases superior in design) from the monumental remains of the ancient Egyptians.—The Assyrians, unlike the Egyptians, whose monumental records abound with details of a domestic character, seem to have found their chief delight in the incidents of war and in the adventures of its peaceful rival the chase. Still evidence relating to the private life of the people can be collected from the sculptures, and we have even the additional confirmation of the remains themselves. We

can reproduce from the relics before us the throne of Sennacherib, rich in metallic chasings and ivory carvings. We can enter his treasure chamber, and separate from the half calcined mass the fragments of "shields, swords, patera, bowls, crowns, caldrons, mother-of-pearl ornaments," &c., that once formed a part of Assyrian magnificence. The forms of household articles of furniture all show great artistic elaboration and a profusion of highly wrought ornament, which is also lavished on dresses, arms, and utensils of all kinds. Couches, chairs of state, tables, stools, and chariots are all marked by this abundance of ornamental detail. Much of this was executed in metal, and specimens enough remain to show the skill of the Assyrians in the various processes of chasing, casting, and hammering out the copper that they procured from the mountains to the north of Mesopotamia. A fierce, haughty, and conquering people, their character is reproduced on their monuments; their delight in the chase seems to have given them a fondness for the forms of animal life, lions' feet, the heads of leopards, &c., being used in decorating furniture and arms, as employed in the present day. The representations of banquets show that tables and chairs were in use. A unique bass-relief introduces to the interior of the king's kitchen; here in one compartment is seen the preparation of the carcasses of animals for cooking, while in others the eunuchs preside over a brazier of elegant form supporting vases used for stewing, &c., and heated by charcoal.—There is no question that Assyrian art through the Asiatic Ionians was the source whence the Greeks derived their first ideas of æsthetic achievements; but whatever they borrowed soon became their own through the transforming influence of an organization and culture which have never been possessed in equal measure by any other people. In the best days of Greece every thing tended to merge the individuality of the citizen in the state of which he was a constituent part; consequently the accessories of domestic life were not regarded as of the same importance as in more despotic countries. Splendor was lavished on the temples and public buildings, not on private structures. The Athenian houses, even in the time of Pericles, were neither large nor stately. For repose, the Greeks had couches, covered with skins or drapery, on which several persons might lie with their bodies half raised; these were used at meal times by the men only, women and children sitting always on chairs; also large arm chairs with footstools, portable small chairs without arms, and stools with curved legs made to fold up. Tripods of marble or metal were in great request for religious and domestic purposes, as well as candelabra and lamps, either supported on a base or suspended from a chain. For the forms of these and other articles, in the absence of any existing remains, we have ample authority in the designs on the so called Etruscan vases. In reality these were the work of Grecian artists in the colonial cities

of Magna Græcia or in Attica itself. They furnish an inexhaustible magazine of the purest ornamental detail, and show how the most trifling objects were conformed to the true principles of the beautiful. Rejecting the animal forms of the Asiatics, the enrichments were derived from a conventional treatment of the most elegant examples of the vegetable kingdom—the acanthus, the honeysuckle, the olive, &c., supplying the “motive” of designs that the eye of taste is never weary of. Endless was the variety of these vases for religious rites or domestic purposes. In them we have an instance of every kind of beauty and elegance of outline that can give value to the humblest material. The immense number still existing of these fragile articles shows how general the use of them must have been.—Among the Romans Greek art still retained its predominance, and the conquerors of the world were at all times glad to employ natives of Greece to design and execute the works intended to display the opulence of their masters. On the ornaments of the *triclinia* or couches on which they reposed immense sums were bestowed. They were often inlaid with precious materials, such as ivory, tortoise shell, gold, and silver, and had ivory or metal feet. They consisted of a framework, sometimes of wood, which was strung with girths upon which rested a mattress stuffed with straw, wool, or feathers, and covered with rich drapery. The *lectus cubicularis*, or bed, was higher than the couch, but not unlike it. The tables were generally of costly foreign wood resting on frames of carved marble or an ivory column. The curule chairs, or seats of state of the patricians, were wrought in ivory; and to form an estimate from the number of beautiful utensils in marble and bronze richly chased and inlaid with silver that have been found in the ruins of a comparatively insignificant city, Pompeii, the wealth of the Romans in movable property of this nature was very great. The library first appears as a separate apartment in a Roman house; that discovered at Herculaneum was small, and lined with presses about the height of a man, in which the rolls of papyrus and parchment were kept. Still, according to modern ideas, the Roman rooms would seem rather bare of furniture. They had no writing tables, or cabinets; couches, chairs, tables, and candelabra comprised the whole of the furniture, with the exception now and then of a water clock, or a chafing dish of coals, in a bronze tripod in winter. The beautiful restoration of a Roman house by Italian artists in the crystal palace at Sydenham, and the Roman villa of Prince Napoleon at Paris, are the chief attempts in modern times to reproduce the effect of a classical interior. Many of the ornamental articles in bronze designed from the antique for the latter are to be found among the latest Parisian importations in our shops.—Until the reformation the development of civilization among the Christian states of Europe took the same forms, and proceeded at nearly an

equal rate. They were in fact in their higher relations portions of a great ecclesiastical commonwealth with a visible and external head. From A. D. 500 to 1500, the ecclesiastical style prevails in furniture as well as in every other species of art, attaining its greatest eminence in the decorated Gothic of the 14th century. Articles of furniture previous to 1500 are of the greatest rarity, and the few specimens that remain occur in connection with ecclesiastical affairs, as the table in Salisbury cathedral on which the wages of the builders were counted out, the abbot of Evesham's conventual chair, the coronation chair of the kings of England, of the time of Edward I., in Westminster abbey, &c. We are therefore obliged to have recourse to the illuminations of MSS. of the middle ages for more familiar details. For 8 centuries after the conquest domestic furniture was very scanty. A bed and a chest were the chief appendages of our forefathers' bedrooms, in the Anglo-Norman era, and tables and benches of the hall. Beds are seldom represented with curtains or canopies, and the chest served the purpose of a wardrobe. The floors were usually of wood, strewn with dried rushes in winter and green fodder in summer. There were no “furniture emporiums;” every article needed was made on the spot by a carpenter. Chairs were large and cumbersome, and were usually fixtures; wooden forms, sometimes with back rails, being placed against the walls. Carpets were first introduced in England by Eleanor of Castile, wife of Edward I., but were not generally used until the 15th century. The furniture of the dining room was very limited. Boards on trestles were in general use as tables; the huge salt cellar was the chief ornament of the board. At royal and noble tables silver goblets, plates, and dishes were seen, but in ordinary houses wooden bowls and trenchers only were used. Earthen ware, though made in the form of pitchers and jugs, does not seem to have been applied to the fabrication of plates and dishes; indeed, in remote parts of England and in institutions famed for conservatism (as the colleges and public schools), the square wooden trencher board, the pewter dishes, and the leathern “black jack” for holding beer, are scarcely yet out of use. A constant current of change in the direction of improvement was in motion during the middle ages, and from these rude beginnings in the 14th and 15th centuries a remarkable progress was made, and a considerable degree of splendor was attained. Defence began to be not the only object studied in the construction of buildings. The apartments expanded in height, and were hung with the newly invented tapestry of the Netherlands (the workshop and exchange of mediæval Europe), called “Arras” from the place of its origin. The Gothic panelling of the carved bedsteads, chairs, screens, &c., was dazzling with scarlet, blue, and gold, and costly embroidered hangings and curtains heavy with heraldic symbolism, cabinets, reading desks, prie-dieus, ivory and enamelled coffers, fire

dogs or andirons elaborately chased and gilt, began to appear, all harmonized to a rich glow of color by the gemmed and jewelled light that stole through the mullions of the storied windows of "bower and hall." The further progress of this decorative style was suddenly arrested by what is called the "renaissance," or revival of ancient classical art and literature, of which Italy was the earliest seat, and from whence the impulse was given that communicated itself speedily to the rest of Europe. Italy indeed occupied then the position now held by France, fabricating and designing most of the costly objects of art and luxury that began to be sought for in remote countries, with the increase of wealth. A genuine and self-evolved style instantly went out of fashion, and was discarded for an imitation and counterfeit one based on the copying of ill-understood classic models, which were applied without consideration to the most incongruous objects. The classical temple was the dominant idea in the manufacture of furniture, as well as in the construction of a palace or a cathedral, and columns were considered as necessary in one species of art as in the other. All the architectural details of Roman building were then applied to furniture; the lions, griffins, chimeras, &c., of the temple frieze encumbered the stately pillars of the Italian palaces, and caryatides and Roman trophies replaced the patron saint and the crucifix. With all its absurdities, it must be noted that this style was in the hands of great men, and their productions display a boldness and vigor of line and a mastery over human and animal forms that give dignity to a licentious freedom of design in which all appropriateness is forgotten. Specimens of the renaissance are still met with, though daily increasing in value. The remarkable collection formed by M. Soulagès of Toulouse of decorative works of this era in marble, metals, earthenware, &c., consists chiefly of articles of household use of Italian design, such as chimney-pieces, cabinets, and candelabra. It was purchased by some English gentlemen in 1856 for about \$120,000, and formed a chief attraction of the great exhibition of the fine arts at Manchester in 1857. The reign of Henry VIII. coincides with the introduction of this new style, whose effect is visible in our present domestic arrangements, Gothic art never having recovered its lost ground. Various articles now of daily use were introduced about this time. Chamber clocks began to be part of the usual furniture of a room. The famous one of silver gilt, designed by Holbein, and presented by Henry VIII. to Anne Boleyn, was purchased by the queen at the sale of Horace Walpole's effects at Strawberry Hill for \$500, and is now at Windsor. The oldest clock that is supposed to go tolerably now in England is at Hampton Court, of the date of 1540. Looking glasses or mirrors were now made in Italy, to be suspended on the walls of rooms, and were among the most costly articles of furni-

ture. A little later musical instruments, both a species of hand organ and the virginals, the earliest form of the modern harpsichord, appear. With various modifications the renaissance style continued dominant for nearly two centuries. In England it degenerated into positive ugliness, the furniture of the time of Elizabeth and James I. having very little to recommend it in tasteful design. It is distinguished by a mixture of overwrought, heavy moulding, combined with thin spindly columns, twisted legs, and other inelegant characteristics. Magnificence is sometimes attempted in the value of the material, as in the famous set of chamber furniture in chased silver executed for a royal visit at Knowle Park, the seat of the dukes of Dorset in Kent. It was succeeded by the style named after the French monarch, its patron and encourager, Louis XIV.—The modern predominance of France in the construction of furniture is owing to the minister Colbert. He it was who brought together the best workmen of Europe, and by an edict of the year 1667 established the French royal manufactory of furniture. The new style which the productions of this establishment assumed appears to have been worked out undesignedly, and, like every such successful phase of art, was the genuine product of circumstances. Novelty and magnificence seem to have been the great features aimed at; these were sought by varied treatment of surface in cabinet furniture (as inlays of metals, ivory, enamels, porcelain tablets, tortoise shell, &c.), and by an incrustation of broken scroll panel work which hid the real constructive forms and frittered away the graceful outlines of the renaissance into a confused and unsymmetrical mass. The famous artist, André Charles Boulle, who has given his name to the inlaid silver, brass, and tortoise shell style known as "Buhl work," was at the head of the royal manufactory with the title of *tapisier en titre du roi*. Under Louis XV. the same school of art continued, and it received new elaboration under the successors of Boulle, Riesner and Gouthier; their works are known to connoisseurs as articles of vertu by the respective styles of each master, and fine specimens bring almost fabulous prices in France. Probably more are to be found in Great Britain than in all the rest of Europe, the French revolution having exerted a fearful influence in bringing about a change of owners of costly movables. One of the finest and earliest specimens of Buhl work known is a secretaire or writing table made for the family of De Retz, now at Windsor, where is also the magnificent cabinet in ormolu and satin wood made in 1780 for the count d'Artois. A grand secretaire in marqueterie, made by Riesner, the *ébéniste de Louis XVI.*, for the dramatist Beaumarchais, at a cost of 85,000 francs, was disposed of by lottery in Paris in 1831, and now belongs to the duke of Buccleuch. At Northumberland house is one of the most precious cabinets in *pietra dura* in Europe, "a truly royal piece," with

the royal crown and cipher, executed in Italy for Louis XIV., and inlaid with precious stones, agates, jaspers, lapis lazuli, the natural colors of which are made to represent birds, flowers, butterflies, &c. While the splendid extravagances of Louis XIV. were holding sway in France, the prevailing taste in England seems rather to have been modified by the fashion introduced from Holland by William III. The native woods, oak or wainscot, chestnut, &c., were about this time superseded for furniture by the dark and heavy West India mahogany, the invariable material of the ill-designed and awkward furniture familiar to us in the immortal designs of Hogarth, and visible here and there in this country in the cherished relics of "colonial times." The prevailing degradation of taste was further visible in the passion for Chinese dragons and porcelain monstrosities, which were the favorite ornamental objects of the time. In the latter part of the reign of Louis XVI. another change is apparent in French furniture. Greece and Rome were looked up to as standards of correctness in furniture as well as in politics. Instead of impressing their own genius on the application of ancient models, as did the great artists of the renaissance, the authors of this revival were content with frigid imitation, and looked rather to Greece than to Italy for their originals. It was encouraged by the emperor Napoleon, who enlisted the genius of his architects Percier and Fontaine in this cause; while in England a similar movement was due to the cultivated taste of Mr. Thomas Hope, who recommended the ancient models for imitation in his work, "Household Furniture and Internal Decorations" (1807), and exemplified his own precepts in his classical mansion and gallery in London. In neither country was the classical style long successful, and since that time the practice of both France and England (and with them the rest of Europe) has been purely eclectic, no new style being introduced and no old one superseding all the others; but at the will of employers workmen are ready to execute designs of every age. A general prevalence of the taste for mediæval objects since 1830 is the most noticeable feature, and has shown itself extensively in building, painting, and decorating; but modern attempts in this style have been very unfortunate, though few of their authors would have the candor of A. W. Pugin, who says, in his "True Principles of Pointed Architecture," speaking of modern Gothic furniture: "We find diminutive flying buttresses about an arm chair; every thing is crocketed, with innumerable mitres, sharp ornaments, and turreted extremities. A man who remains any length of time in a modern Gothic room and escapes being wounded by some of its minutæ may consider himself extremely fortunate. I have perpetrated many of these enormities in the furniture I designed for Windsor castle, as at that time I had not the least idea of the true principles to be followed." If any style can be considered the favorite one in the United States,

it is a bastard Louis Quatorze, with all its characteristic failings carried to excess in design, though the workmanship of articles in ordinary use is very good. The English claim the merit of the best material and excellent workmanship; they confess that the artistic education of the French artisans gives them a superiority in design that they can hardly hope to equal.—In France the manufacture of furniture has become an important source of national wealth. Its chief seat is Paris; in 1855 from 25,000 to 30,000 workmen were employed in the various processes, and the value of the products was estimated at about \$18,000,000. In America a large proportion of the workmen are Germans, who have impressed some of the characteristic heaviness of their taste on the articles produced for common use. The higher class specimens are all executed from French designs. The finer qualities of mahogany have been getting scarce since the loss of the supplies formerly obtained from Hayti. It was succeeded in public favor by rosewood, a beautiful wood from South America and the West Indies; this has in its turn been superseded by the native black walnut, which by peculiar treatment is made susceptible of the finest polish, and is admirably adapted for the display of carved work. Among American inventions may be mentioned what is technically called "knock-down furniture;" the name is applied to complete sets of furniture, which are made to come entirely apart, so as to pack for transport to the West, &c., in a very small compass. The chair manufacture is a branch pursued to a great extent in Massachusetts, where the town of Gardner is largely engaged in it. Not a ship leaves with an assorted cargo for South America and the East Indies without having on board American boxed chairs in dozen and half dozen cases. Thousands of dozens are thus annually exported, and this demand always continues. They are turned by steam power from the maple, beech, and other hard woods, the only foreign article employed being the Indian ratan, which is split by machinery for the seating.

FURRUCKABAD, a district of British India, in the province of Agra, bounded N. by the districts of Budaon and Shahjehanpore, E. by the territory of Oude, S. and W. by the districts of Etawah, Cawnpore, and Mynpooree; area, 1,909 sq. m.; pop. 1,064,607, mostly Hindoos. The soil is of various quality. Much of that on the banks of the Ganges is deep, rich, and marshy, and in the rainy season is scarcely habitable. The central region is fertile, while the southern parts are thickly wooded. The principal productions are indigo, cotton, wheat, barley, maize, sugar cane, timber, and tobacco. In 1802 the E. I. company took possession of this district, pensioned its nabob, and annexed it to the Bengal presidency.—FURRUCKABAD, the chief town of the district, is situated near the right bank of the Ganges; pop. 56,800. The trade is considerable. Here was formerly a mint, the coinage of which

circulated largely throughout the N. W. provinces. It was abolished in 1824.

FÜRST, JULIUS, a German orientalist of Jewish race, born in Zerkowa, in the duchy of Posen, May 12, 1805, studied at Posen and Breslau, and in 1833 became teacher (*Docent*) of the oriental languages. His historical, grammatical, and lexicographical works are numerous and valuable; the principal of them are a "System of the Aramaic Idioms" (1835); *Concordantia Librorum Sacrorum V. T. Hebraica et Chaldaica* (Leipsic, 1837 *et seq.*); "Hebrew and Chaldean Dictionary for Schools" (1842); "Religious Philosophy of the Jews in the Middle Ages" (1845); "History of the Jews in Asia" (1849 *et seq.*); *Bibliotheca Judaica* (3 vols, 1849-'53); "Manual Dictionary of the Hebrew and Chaldean Languages" (1851 *et seq.*). From 1840 to 1851 he edited the "Orient."

FÜRTH, a town of Bavaria, in the province of Middle Franconia, situated at the confluence of the Rednitz and Pegnitz rivers,  $4\frac{1}{2}$  m. by rail from Nuremberg; pop. 16,000. This railway, opened in 1835, was the first in Germany, and now extends from Frankfort to Munich. About 3,000 of the population are Jews, who have a high or Talmud school, 3 minor schools, several synagogues, 2 printing houses, a religious and civil court of justice, a hospital, and an institution for orphans and for the employment of their poor.

FUSE, SAFETY, a tubular cord of cotton, rendered slowly combustible for communicating fire to the powder in blasting. The cavity in the centre of the cord is filled with some slow-burning powder, and the cord is then wound with tarred twine, and covered outside with a coating of tar. It is thus protected from moisture, and is made sufficiently firm and hard not to be cut by the fragments used in tamping. It is either "double" or "single," the former being protected with an extra quantity of tarred covering, so that it can be used for exploding the cartridges used in wet holes. The latter, being only about half the price, is commonly used in dry blasting. It burns about 3 feet in a minute. A method has been patented of introducing a combustible thread through the centre of the cord in the powder, with the view of providing another means of communicating the fire in case the powder is interrupted or the cotton of the tube does not continue to burn. For its use, see **BLASTING**.

FUSEL OIL, a liquid colorless when pure, of offensive smell and burning taste, obtained by continuing the distillation of the fermented infusions used for the preparation of ardent spirits after the alcoholic portion has been drawn off. In this condition, however, it is mixed with water, from which it should be separated by a second distillation, the water coming over first. As this brings with it a portion of oil, it is to be set aside for the latter to separate, and form a layer on the surface. Ardent spirits contain fusel oil, particularly if the distillation has been pushed far. It is detected by redistilling whis-

key, especially that obtained from potatoes, a milky fluid coming over at the last, from which the oil separates by standing; or by redistillation, water first coming over, and then the oil at its boiling point of  $269^{\circ}$ . Thus obtained, it is usually of a pale yellow, of specific gravity 0.818; at  $4^{\circ}$  below zero it congeals in crystalline leaves. It inflames only when heated to  $130^{\circ}$ . It unites with alcohol in all proportions, but has little affinity for water. The resins, fats, camphor, sulphur, phosphorus, &c., are dissolved by it. Upon the animal system it acts as an irritant poison; its vapor produces nausea, headache, and giddiness. Its composition is represented by the formula  $C_{10}H_{12}O_2$ ; or, on the supposition of its being a hydrated oxide of amyle, its formula is  $C_{10}H_{11}O, HO$ . Fusel oil is used to some extent for burning in lamps, and for dissolving copal and other resins for varnishes, &c. Its presence is highly injurious to liquors, and when in sufficient quantity to be perceptible to the smell and taste, indicates bad rectification or the use of damaged grain. It may be detected by agitating the liquor with water, and leaving it to stand for the oil to rise and appear at the surface. It is separated in rectifying by the introduction of some soft wood charcoal, as pine or willow. Olive oil also may be added, and the mixture being well shaken the oils will afterward collect together at the surface, when they may be decanted and the spirits be again distilled.

FUSELI, HENRY, a painter and writer on art, born in Zürich, Switzerland, Feb. 7, 1741, died in London, April 16, 1825. His father was John Casper Füssli, also a painter. Having been destined for the church, he received a good classical education at his native town, and in 1761 took orders; but his predilection for his father's art had led him from childhood to cultivate it in secret, notwithstanding the parental prohibition. A pamphlet written by himself and Lavater, who was his schoolfellow, in which a public functionary was severely handled, was the cause of his leaving Zürich, and after spending some time in Vienna and Berlin he went to England, where for a time he supported himself by literary labors. Sir Joshua Reynolds, to whom he showed some of his drawings, advised him to devote himself to art, and he accordingly spent 8 years in Italy among the works of the old masters. Here he changed his name to its Italian form, which he ever after retained. Returning to England in 1778, he executed a number of pictures for Alderman Boydell's celebrated "Shakespeare Gallery." In 1790 he was elected an academician, and in 1799 he exhibited a series of 47 designs on a large scale from Milton's works. In the same year he became professor of painting in the academy. Among his literary labors was a translation of his friend Lavater's "Aphorisms on Man." He wrote in a clear and vigorous style, and his lectures before the royal academy were considered among the best specimens of art criticism in English literature. As a painter Fuseli

possessed great invention, and his mind was capable of the most daring conceptions; but his imagination was too active for the control of his judgment, and the unnatural contortions and superfluous energy of his figures show that he had neither a true idea of form nor a just appreciation of the genius of Michel Angelo, of whom he affected to be an imitator.

**FUSIBILITY, Fusion.** Bodies are said to be in fusion when, by absorption of latent heat, they pass from a solid to a liquid state. The property of fusibility at some temperature is probably possessed by all bodies, but some are so altered by chemical changes among their own elements or by the action of external bodies in contact, that they cease to retain their individual characteristics before their melting point is reached. Although it seems that in some crystalline organic compounds, and also in some of the fats, the fusing point varies after the body has been once melted, it is generally the case that the fusion takes place at a constant temperature for the same body, that this point is ascertained for many, and is given with each as one of the distinctive qualities. Carbon, however, resists this determination, and the assertions of its fusibility made by some experimenters are not generally admitted as establishing the fact. The range of the fusing point of bodies is very great, some existing in the solid state only far below the ordinary temperatures, while others require the most intense artificial heat to cause them to assume the liquid form. This is exhibited in the following table, which comprises many of the bodies thus arranged by Pouillet:

Substances.	Degrees Centigrade.	Degrees Fahrenheit.
English hammered iron.....	1,600	2,912
Steel.....	1,300 to 1,400	2,372 to 2,552
Gray cast iron, second fusion.....	1,200	2,192
White cast iron, very fusible.....	1,050	1,922
Very fine gold.....	1,250	2,282
Standard gold.....	1,180	2,156
Silver, very pure.....	1,000	1,832
Bronze.....	900	1,652
Antimony.....	482	810
Zinc.....	380	696
Lead.....	320	608
Blismuth.....	292	556
Tin.....	230	446
Sulphur.....	114	237
Iodine.....	107	225
Phosphorus.....	43	109
White wax.....	63	154
Spermaceti.....	49	120
Ice.....	00	32
Oil of turpentine.....	-10	14
Mercury.....	-39	-88

The fusing point of oils, &c., is ascertained by introducing them together with a fine thermometer into small glass tubes, and placing these in water, which is gradually heated till the substances melt. The thermometer indicates the temperature. The method of determining the high melting points of the metals, &c., will be described in the article PYROMETER.

**FUSIBLE METALS.** See ALLOY, and BISMUTH.

**FUSTIAN**, coarse twilled cotton fabrics, including corduroy, velveteen, velverett, thick-sett, moleskin, &c. The common fustian is a

twill of 4 or 5 leaves, of close and stout texture. Velveteen differs from velvet only in the material, which is cotton, while that of velvet is silk. Some fustians also are made in the same manner as satin. Moleskins are smooth fustians shorn before dyeing; beaverteens are the same material, but shorn after dyeing. Canton is a fustian with a fine cord visible upon the one side, and a satiny surface of yarns running at right angles to the cords upon the other side. The colors of these goods are usually leaden, olive, or dark.

**FUSTIC**, the dye wood of the *morus tinctoria*, a tree which grows to a great height in Brazil and the West India islands. A yellow dye is obtained by boiling the wood, and this is principally used for converting silks and woollens, cotton yarns and light fabrics, already dyed blue, to a green. Its use is almost wholly for compound colors—bichromate of potassa and lead giving a better yellow. The yellow crystalline substance morin separates from a concentrated decoction of fustic by cooling. The wood is known as old fustic to distinguish it from the wood of the *rhus cotinus*, or Venice sumach, which is sometimes called young fustic, but more properly *fustet*, the name used by the French. It is a shrub cultivated in Italy and the south of France for purposes of dyeing and tanning. Its wood gives a yellowish decoction, which is used as an assistant to procure some particular tint. The color is too fugitive for use alone. The principle fustin is extracted from this wood.

**FUTTEHGHUR, FUTTGURH, or FATAGHUR**, a military station in the district of Furruckabad, N. W. provinces, British India, on the right bank of the Ganges, 8 m. below Furruckabad, of which it is little more than the cantonment, and 703 m. N. W. from Calcutta. It contains a church, and a large factory and storehouse of gun carriages. On June 18, 1857, the Futtehghur troops suddenly rose, and the Europeans, numbering about 100, of whom 80 were fit to bear arms, fortified themselves in the yard of the gun carriage warehouse, where they made a gallant defence until July 4. Then, driven to extremities, they embarked on the river, where many perished by drowning or were shot by the rebels. A few reached the shore and escaped; one boat kept on its voyage to Bittoor, where its occupants were seized, placed in confinement at Cawnpore, and made to share the fate of the unhappy European residents of that town.

**FUTTEHPOOR**, a district of British India, in the Doab, having N. E. and E. the Ganges and the province of Allahabad, and S. W. and N. W. the Jumna and Cawnpore; area, 1,583 sq. m.; pop. 679,787. The climate, like that of southern Oude, is remarkable for its aridity and wide range of temperature. The soil is fertile, and the principal productions are indigo, wheat, barley, cotton, opium, and sugar cane. The great trunk road from Calcutta to Delhi and the northern Doab passes through the ter-

ritory of Futtahpoor. This district formerly belonged to the nabobs of Oude, but was ceded to the E. I. company in 1801, who annexed it to the presidency of Bengal. Since the division of that presidency it has constituted part of the government of the N. W. provinces.—FUTTEHPOOR, the capital of the above district, is a large, well built town, 70 m. N. W. from Allahabad, with which it has communication by the great trunk railway, opened to this point March 25, 1858; pop. 20,864. The town was taken by the rebels during the great revolt, and was recaptured by Gen. Havelock, July 12, 1857, after an engagement of 4 hours, in which the rebels suffered severely and lost 12 guns, while no British soldier was either killed or wounded.

FUTTIPOOR SIKRA, or FUTTEHPOOR SIKRI, a town of the N. W. provinces, British India, in the district of Agra, and 23 m. W. from the city of that name; pop. 5,949. It is enclosed by a high stone wall, 5 m. in circuit, with towers and battlements, but contains little more than heaps of massive ruins, a grand mosque, and a good bazaar. The mosque is built on a commanding hill, and is still in tolerable repair. Its gateway is 73 feet high from the pavement to the summit of the interior outline, or 120 feet to the exterior summit. Westward of it are the remains of a vast palace, with terraces, gardens, irrigating canals, wells, and long rows of handsome stables. All the apartments are

arched, and appear to have been highly decorated. Near it there is a column 40 or 50 feet high, built of composition moulded to imitate elephants' tusks; and outside the walls is a ruined embankment, 20 m. in circuit, which pent up the waters of a torrent till they formed a broad lake, on the margin of which was an amphitheatre for public games, elephant fights, and other amusements. These great works were constructed as late as the year 1571 by the emperor Akbar. On Oct. 28, 1857, a body of rebels were defeated here by a British force from Agra.

FYZABAD, or BANGLA, a town of British India, in the territory of Oude, situated on the right bank of the Goggra, which in the rainy season is here sometimes 1½ m. wide, 89 m. E. from Lucknow; pop. estimated at 100,000. It was founded by Saadat Ali Khan, 1st vizier of Oude, and was beautified by his successors, particularly by Surajah Dowlah, under whom it became the capital instead of the ancient city of Oude or Ayodha, adjoining it on the S. E. In 1775 the seat of government was removed to Lucknow. Since that time the deserted city has been falling to decay, and its population is rapidly decreasing. On June 8, 1857, 2 native infantry regiments, a troop of cavalry, and a detachment of artillery, mutinied here, placed their officers in confinement, and next day sent them in boats toward Dinapoor.

## G

G, the 7th letter of the Latin and of almost all other European alphabets, was originally the 3d in the Phœnician and other ancient Semitic graphic systems, as well as in the Greek and ancient Italic. Its Semitic name, *gamal*, *gimel*, changed into *gamma*, arose from its similarity in shape to a camel's neck. It was pronounced in all those languages, and in the Celtic, Mæso-Gothic, Anglo-Saxon, Frisian, and other ancient German tongues, as in our words *go*, *get*, *give*, *glib*. This sound was wanting to the Etruscans and Sabines; and as the Romans first wrote it with Q, like the Umbri, employing K for the corresponding close sound (*s. g. LECIONES, ECFOCIONT, &c.*, for *legiones, effugiant*, on the *columna rostrata* of Duilius; *Caius, Cneus*, pronounced *Gaius, Gneus*; *Kæso* for *Cæso*, &c.), a freedman of Spurius Carvilius Ruga (6th century of the city) formed the G from the Q, for the designation of this mild guttural sound. As such it was inserted between F and H, in the place of the Semitic *gim*, answering to *ggra*. In Armenian and Georgian it is also the 3d letter, in Slavonic the 4th, in the various Irish writings the 10th or 11th, in the Runes *stungen kaun* (pointed K) or *gmael*. *Gim*, the 5th Arabic letter, although made from the 3d Oufic, is uttered with the hissing dental sound of our J; while *ghain*, the 15th (intensive *ain*), represents the deepest

guttural sound with a whirring of *r*. All these circumstances betray the organic affinity of sounds in various idioms. As, moreover, the sounds of *ain* and *ghain* are the prototypes of all vocality (faucaity), we obtain *u*, *i* (*y*), with their consonants *v*, *w*, *j* (*y*), which are to be added to *k*, *h*, *f*, *z*. Jacob Grimm's scheme completes these affinities:

Greek.	Gothic.	Old High German.
Γ	K	OH
X.	G	K
K	H (G)	G

The genuine sound of G is guttural, and is thus produced: the posterior part of the tongue is raised toward the *velum palatinum*, which sinks to meet it; after a slight contact both are suddenly withdrawn, allowing the breath to pass, while the larynx oscillates and the margins of the glottis are contracted. This oscillation renders the G more sonorous and mild than K. The spurious sounds are more or less harsh dental hisses. G is guttural in the Romanic languages and in high German before *a*, *o*, *u*; before *e*, *i*, *y*, it is dental and hissing, and might be indicated by *dzh* in Italian, English, and Portuguese, and by *sh* in French (like *s* in *glacier*). In Spanish it sounds in those positions like *h* in *helmet*. The Bohemians pronounce it, even before *a*, *o*, *u*, like *y* in *yard*. In Italian *gli* answer to Fr. *ill mouille*, Span. *ll*, Portug. *lh*,



Magyar *ly*; Ital. and Fr. *gn* to Span. *ñ*, Portug. *nh*, Magyar *ny*. But Magyar *gy* is pronounced as if it were written *dy*. In Latin the final sound of a preposition, followed in composition by a *g*, is assimilated to the latter, as *aggro*, *suggero*, for *ad-gero*, *sub-gero*.—The following are specimens of interchanges of *G* with various letters: *O*, *K*—Heb. *gades*, Arab. *kadi*, heap of sheaves; Heb. *gānaz* and *kānaz*, to collect, &c.; Gr. *γροφερος* (dark), Lat. *creperus*, *crepuscus*; Προκνη, *Progne*; κυκνος, *cygnus*; *rego*, *recti* (recti), *rectum*; *vicesimus* and *vigesimus*; *longus*, *longus*, Provençal *laro*, *long*; *Gades*, *Cádiz*; *crassus*, *groesus*, *acutus*, Fr. *gras*, *gros*, *aigu*; Fr. *cicogna*, second, pronounced *cigogna*, second; Gr. *γόνυ*, Lat. *genu*, Eng. *knee*; Lat. *genitus*, Germ. *Kind*; Lat. *generosus*, *generatus*, Eng. *kind*, *kindred*, &c. *Ch*, *H*—Gr. *χην*, Germ. *Gans*, Eng. *goose*, *gander*, Bohem. *hus*; Gr. *χηνς*, Lat. *hesternus*, Germ. *gestern*, Eng. *yesterday*, &c. *I*, *J*, *Y*, *U*, *V*, *W*, *X*—Provençal *esay*, Fr. *esai*, *esayer* (barb. Lat. *ezagium*); Lat. *rex*, *regem*, *regalis*, *lex*, *legalis*, &c., Sanscrit *rajah* (dialect. *rayah*), Fr. *roi*, *royal*, Sp. *rey*; Fr. *loi*, Sp. *ley*, Eng. *law*; Germ. *Nagel*, *Segel*, *Regen*, *Tag*, *Säge*, *sagen*, *folgen*, *sorgen*, &c., Eng. *naïl*, *sail*, *rain*, *day* and *dawn*, *saw*, *say* and *said*, *follow*, *sorrow*; Lat. *gilvus* (*helvus*, *fulvus*, *flavus*), Germ. *gelb*, Eng. *yellow*; Lat. *hortus*, Germ. *Garten*, Eng. *yard*, *ward*; Germ. *Hagen* and *Hain*, *Hecke*, *Hagedorn*, Fr. *Haie*, Eng. *Hague*, *hedge*, *hawthorn*; Gr. *γυρενς*, Lat. *gyrare*, Provençal. *virar*, Fr. *virer*, whence *environ*, &c. Promiscuous examples: Germ. *Gundobert*, Fr. *Jombert*; Ang. Sax. *gafild*, Eng. *gavelock*, Fr. *javelot*; Sp. *hielo*, *hiema*, *hieso* (obsolete *yelo*, *yema*, *yeso*), from Lat. *gelu*, *gemma*, *gypsum*; Sp. *hermano*, (Portug. *irmao*), *kinojo*, from Lat. *germanus*, *genu* (*geniculum*); Sp. *laja*, from Germ. *Lage*; Germ. *schlagen*, *Schlacht*, Eng. *slay*, *slaughter*. Compare *guardian*, *guerre*, *guêpe*, *gain*, *Gallus*, with *warden*, *war*, *vespa*, *win*, *Wallon* and *Wales*; Fr. *Jacoux*, Lat. *Gabali urbs*; Slavic dialects, *hospodin*, *hlava*, *holub*, *Halica*, *hora*, &c., with *gospodin* (master, lord), *golova* (head), *golub* and *golomb* (Lat. *columba*), *Galicia*, *gora* (mountain), &c.; *gallus* with Germ. *Hahn*. Gr. *καμη* (a bent) gave Fr. *jamba*, *ingamba*, Eng. *ham*, Fr. *jambon*. Unorganic, accidental substitutions: Fr. *changer*, from barb. Lat. *camdiare*; Turkish *Gharandaberk* (for Prussia), from *Brandenburg*; Gr. *γαλαρος* and *βαλαρος*, Lat. *glans*, Eng. *acorn*; Gr. *γληχων* and *βληχων*, whence Lat. *pulegium*; Gr. *Δημητηρ* and *Γημητηρ*, *δευκος* and *γλευκος*, *γλυκς*, Lat. *dulcis*; Gr. *σαγμα*, Romanic *salma*, *soma*, Germ. *Saum*, load of a beast of burden; *Bagdad*, Ital. *Baldacco*; Gr. *σμαργδος*, Ital. *smaraldo*, Fr. *émeraude*. The degeneration of the guttural *G* into the dental is foreshadowed by the Greek *Z*, which sounds as if it were written with the English *ds* or *ed* combined; hence the correspondence between *ζηλος* and Ital. *geloso*, Fr. *jalous*, Eng. *jealous*; *Zeus*, *Διός*, *Dispiter*, *Jupiter*, Ital. *Giove*, like *giorno* from Lat. *diurno*, Fr. *jour*, &c. *G* is omitted in Latin *fibula*, *examen*, *con-*

*tamino*, &c., from *figibula*, *exagmen*, *contagmin*; *nascor*, *nosco*, *narus*, *navus*, which correspond to *γίγνομαι*, *gignor*, *γινώσκω*, retaining the *g* in compounds, as in *cognatus*, *cognitus*, *ignarus*, *ignavus*; Ital. *Aosta*, Fr. *aodt*, Lat. *Augusta*; Ital. *nero*, *leale*, *sciaurato*, *conoscere*, from Lat. *nigro*, *legale*, *exaugurato*, *cognoscere*, &c.; Sp. *pereza*, Fr. *paressa*, Lat. *pigritia*; Provençal *flairar*, Fr. *flairer*, Lat. *fragrare*; Ital. *coitare*, *freddo*, *paese*, &c., Sp. *cuidar*, *frio*, *país*, from Lat. *cogitare*, *frigidus*, *pagenses*; Ital. *augmentare*, *frammento*, from Lat. *augmentare*, *fragmento*; Fr. *bénin*, *malin*, Lat. *benignus*, *malignus*. The German particle *ge* (Lat. *cum*, *que*, *ac*), a formative of the past participle, collective nouns, &c., is expressed in English by *e*, *y*, *a*; thus: *enough*, *yclad*, *agone*, Germ. *genug*, *gekleidet*, *gegangen*. From the last we obtain also *yon*, *yonder*.—During the decline of Latinity *G* was used to designate 400, and  $\bar{G}$  400,000. As an abbreviation it denotes Gellius, Gallia, Germania, Galeria tribus, gens, gratia; and in the middle ages Senarius. On modern coins it indicates Poitiers, Geneva, Nagy-Bánya in Hungary, and Stettin in Pomerania. It is the last dominical letter.—In music, it is the name of the 5th diatonic  $\sharp$  interval, and the 8th string of the diatonic  $\sharp$  chromatic string. It is the clef—altered into  $\sharp$ —of the violin or the treble. Capital *G* marks the deepest tone of the human voice; its octave being the small *g*. It is named *sol* in solmization.

GABELENTZ, HANS KONON VON DER, a German philologist, born in Altenburg, Oct. 13, 1807, has written *Éléments de la grammaire Mandchoue* (Altenburg, 1832); *Grundsätze der Syrjanischen Grammatik* (1841); *Beiträge zur Sprachenkunde* (Leipzig, 1852–'8); *Grammatik und Wörterbuch der Kassiasprache* (1857), &c.

GABELLE, a French word derived from the German *Gabe*, gift or tribute, meaning originally every kind of indirect taxes, but afterward applied exclusively to the duty upon salt. This, from the beginning, was the most unpopular of taxes; its arbitrary assessment, and the tyrannical measures of the officers intrusted with its collection, frequently caused rebellions among the poor people in the provinces of France; while every kind of subterfuge was resorted to in order to avoid the payment of it. It was finally repealed in 1790.

GABOON RIVER, called also the Mpongwe in the language of the people at its mouth, is a large river of western Africa, in lat.  $0^{\circ} 30' N.$ , long.  $9^{\circ} E.$ , about 120 miles in length, which takes its rise in the Sierra del Crystal mountains. It empties into a large bay 12 or 15 m. wide, 10 long, and 7 wide at its mouth, which receives also the waters of several smaller streams, and in which are two islands known as Parrot and König islands. The Gaboon is a broad and deep stream, with hardly any current, the mass of its waters being due to the tide, which rises from 7 to 9 feet at 60 m. from its mouth. The river is very unhealthy; mangroves abound along its shores. At the mouth of the river the French established in 1843 a fortified factory.

The exports in 1854, consisting chiefly of various kinds of gum, amounted in value to \$174,689.

GABRIEL (Heb., the mighty one of God), the angel sent to Daniel to interpret the vision of the ram and the he-goat (Dan. viii.), and to communicate the prophecy of the 70 weeks (Dan. ix. 21-27); employed also to announce to Zachariah the birth of John the Baptist (Luke i. 11), and that of the Messiah to the Virgin Mary (Luke i. 26). Though nothing is stated in the Scriptures concerning his rank, he is accounted both by Jewish and Christian writers one of the archangels. According to rabbinical legends, he is the prince of fire, and presides over the ripening of fruit; he alone of the angels understood Chaldee and Syriac, and taught Joseph the 70 languages spoken at Babel; and he with Michael set fire to the temple at Jerusalem and destroyed the host of Sennacherib. Mohammedan writers esteem him one of the 4 most highly favored angels; he is styled the spirit of truth, and to him a copy of the Koran was committed, which he dictated in successive portions to Mohammed.

GACHARD, LOUIS PROSPER, principal archivist of Belgium, born in France about 1800, was at first a journeyman printer, joined the Belgian revolution of 1830, was naturalized in Belgium in 1831, appointed archivist, and in 1834 a member of the academy of Brussels. He has most diligently explored the archives of Simancas in Spain, and others at home and abroad, and has published a great number of works and documents relating to the history of Belgium. Among his more recent publications are: *Correspondance de Guillaume le Taciturne* (4 vols. 8vo., Brussels, 1847-'51); *Correspondance de Philippe II. sur les affaires des Pays-Bas* (3 vols. 4to., Brussels, 1848-'51); *Correspondance du duc d'Albe sur l'invasion du comte Louis de Nassau en Fries* (Brussels and Leipsic, 1850); *Lettres écrites par les souverains des Pays-Bas aux états de ces provinces, 1559-1794* (Brussels and Leipsic, 1851); *Retraite et mort de Charles V.* (Brussels, 1854); and *Relations des troubles de Gand sous Charles V., par un anonyme*, accompanied with 330 documents (4to., Brussels, 1856). Mr. Prescott says, in his edition of Robertson's "History of Charles V." (Boston, 1857), that M. Gachard's work on that emperor places at the disposition of the future biographer of Charles the original materials with which to reconstruct the history of his latter days. During the recent discussions in Brussels (July, 1859) respecting a national monument to Egmont and Horn, the city authorities decided against it, chiefly upon the ground of the new and less favorable light thrown upon the character of these heroes by the historical documents which were published under M. Gachard's auspices.

GADARA, a city of Palestine, the capital of Peræa (or "the country beyond the Jordan"), and one of the 10 cities called the Decapolis. It was E. of the Jordan, and about 8 miles S. E. of Lake Tiberias, and gave its name to the can-

ton or district known as Gadaritis or the country of the Gadarenea. In Matthew it is called the country of the Gergesenes, but this term, as well as the existence of the city of Gergesa, is supposed to have been invented by Origen in the endeavor to reconcile various readings, as no such city can be traced. Though now wholly in ruins, in the time of Josephus Gadara was an important city, strongly fortified, having a court of justice, and in its vicinity several famous hot baths and medicinal springs, reckoned by the Romans inferior only to those of Baia. It was probably near this place that Christ wrought the miracle recorded in Luke viii. 26-36, on the demoniac who "had his dwelling among the tombs;" and we are told by modern travellers that there may still be seen the remains of those ancient tombs, hewn in the rocks by the early inhabitants of Galilee, which even now seem a fit resort for such wretched outcasts of society as had their dwelling in them 2,000 years ago.

GADDI, I. GADDO, a Florentine artist, born in 1249, died in 1312. He was an excellent worker in mosaic, and a friend of Cimabue, whose manner he combined with the Greek style then prevalent in Italy. He is considered the founder of the modern mosaic art, which, in conjunction with his friend Andrea Taffi, he brought to great perfection. He also painted altarpieces. II. TADDEO, son of the preceding, a painter, born in 1300, was living in 1352. He was the godson and favorite pupil of Giotto, whose style he developed, and whom he is even considered to have excelled in beauty and grandeur. Many of his finest works in Florence, and all that he painted in the Campo Santo at Pisa, have been destroyed by time, but his smaller pictures are to be found in the principal galleries of Europe. His decorations of the Spanish chapel in the church of Santa Maria Novella at Florence, in competition with Memmi, are among the finest specimens of art produced in the 14th century. Some figures of the fathers of the church in the latter series, representing religion, have been considered the grandest development of the allegorical style introduced by Giotto. On one of the walls of this chapel are the reputed portraits of Petrarch and Laura. Taddeo was also distinguished as an architect. III. ANGELO, son of the preceding, also an artist, born, according to Baldinucci, about 1324, died in 1389. He was an imitator of his father and of Giotto, but did not improve in proportion to his abilities. He lived for many years in Venice, where he engaged in commerce, and has been considered, though on doubtful authority, the founder of the Venetian school.

GADE, NIELS WILHELM, a Danish composer, born in Copenhagen, Oct. 22, 1817. He commenced the study of music at a comparatively advanced age, and in a few years became an accomplished performer on the violin and piano forte, after which he devoted himself to composition. In 1841 his overture entitled *Nach Klänge von Ossian* ("Echoes of Ossian") received

the prize of the Copenhagen musical union, and secured to him a royal stipend to travel and study his art abroad. He passed several years in Germany and in Italy, and greatly increased his reputation by a symphony in C minor. The favor with which this work was received in Leipsic induced him to visit that city, where in 1844 he was appointed to succeed Mendelssohn in the direction of the Gewandhaus concerts. In 1850, having received the appointment of royal chapel master to the king of Denmark, he returned to Copenhagen, where he has since resided. Among his published works are 4 symphonies, a number of overtures, sonatas, quintettes, and romances, *Comala*, a lyrical drama, and the *Nibelungen*, an opera. Some of his symphonies have been performed with effect in England and the United States, and the first, from its romantic, dreamy tone, is a favorite in the concert room.

GADFLY, a dipterous insect, belonging to the genus *tabanus* (Linn.), with 3-jointed antennae and wide-spreading wings. The gadflies are among the most bloodthirsty and tormenting of insects; they attack not only man, but cattle, horses, camels, and various ruminating animals. The most common species in the United States is the *T. atratus* (Fabr.), of a black color, with a whitish bloom on the back, like that of a plum; the eyes are very large, almost meeting at the top of the head, and of a shining purplish or bronze black color, with a jet black band across the middle; it is about an inch long, with an expanse of wings of nearly 2 inches. The orange-belted gadfly (*T. cinctus*, Fabr.) is smaller and less common, black, with the first 3 abdominal rings orange-colored. A smaller and very common species is the *T. lineola* (Fabr.), which has a whitish line along the top of the hind body. There are many other American species, described and undescribed. There are about 40 European species, for a knowledge of whose habits and metamorphoses we are principally indebted to De Geer. The species which so torments cattle is the *T. bovinus* (Linn.), about an inch long; the thorax and abdomen are dark brown, the former with yellowish hair, and the latter with a reddish yellow cross band on the hinder edge of the segments, and bright yellow triangular spots; abdomen yellowish gray, with black triangular spots; thighs dark brown, and tibiae bright yellow. These insects appear about the end of June, and continue their attacks through summer; the proboscis, though not very long, is armed with 6 very sharp needles, by which they can pierce the thickest hide. It is said that they will not touch a horse whose skin has been thoroughly washed with a strong decoction of walnut leaves. Camels are worried by a species of *tabanus*; and the moose is so tormented by them that he immerses himself in water to escape their attacks, leaving out only the tip of the nose for purposes of respiration.—In the allied genus *chrysops* (Meigen), or golden-eyed gadflies, may be mentioned the *C. cæcu-*

*tiens* (Meig.), about  $\frac{1}{4}$  of an inch long, common in Europe in meadows and pasture lands, stinging both men and horses very severely; the yellowish brown thorax is marked with 8 long black stripes; wings white with blackish brown spots; abdomen yellowish. American species are *C. ferrugatus* (Fabr.), of a black color, and *C. vittatus* (Wied.), striped black and yellow; they are found in woods and thickets in July and August. The genus *hamatopota* (Meig.) contains the troublesome gadfly called *cleg* in Scotland; this, the *H. pluvialis* (Meig.), is about the size of the common house fly; the large eyes are greenish, with 4 undulating brown bands running through each of them; the body is gray, with brownish cross stripes; the wings gray, spotted with brown. It attacks man, cattle, and especially horses, in sultry weather just before rain; the wounds are painful at the time, but are not followed by any lasting burning or itching.—The name of gadfly is also given to several species of *æstrus*, especially to that one which deposits its eggs about the knees and sides of the horse, and which, conveyed into this animal's stomach, constitute the disease known as bots. (See BOTS.)

GADSDEN, a N. co. of Fla., bordering on Georgia, bounded E. by the Ocklockonee river, and W. by the Appalachicola; area, about 1,260 sq. m.; pop. in 1850, 8,783, of whom 4,879 were slaves. It has an uneven surface and a fertile soil, suitable for tobacco, cotton, sugar, &c. The productions in 1850 were 776,177 lbs. of tobacco, 292,850 bushels of Indian corn, 143,000 of sweet potatoes, 65,403 gallons of molasses, 5,609 bales of cotton, and 108,370 lbs. of rice. The production of tobacco and molasses was greater than that of any other county in the state, and that of Indian corn exceeded all but Leon. There were 20 churches and 800 pupils attending public schools. Capital, Quincy.

GADSDEN, CHRISTOPHER, an American statesman of the revolutionary period, born in Charleston, S. C., in 1724, died in the same city, Aug. 28, 1805. He was sent to England to be educated, and studied under the care of his relatives, returning to Charleston in his 17th year. He was soon after apprenticed to a merchant in Philadelphia, with whom he remained till his 21st year. After a second visit to England, he engaged in mercantile business in Charleston. His father had possessed a large estate in Charleston, but had lost it in play with Admiral Anson, on his visit to that city in 1733. The success of Christopher in commerce enabled him to recover by purchase all this property. He was one of the boldest in denouncing British oppression from the time of the stamp act. Near his residence was a wide-spreading oak, under which the patriots were wont to assemble in 1765 and 1766 to discuss the political questions of the day. The oak was therefore called the "liberty tree," and beneath it, amid the rejoicings which followed the repeal of the stamp act in 1766,

Gadsden, who was in correspondence with Samuel Adams, warned his friends not to be lulled into a dangerous inactivity. It is claimed that more than 2 years before he had first spoken of American independence. As the revolution advanced, he was one of the most resolute patriot leaders in both civil and military affairs. He was a delegate to the stamp act congress, which assembled in New York in 1765; a delegate to the first continental congress in 1774, in which he urged an immediate attack upon Gen. Gage at Boston; became senior colonel (and afterward brigadier) of 3 South Carolina regiments in 1775; was actively engaged at the siege of Charleston in 1776; was one of the framers of the constitution of South Carolina, adopted in 1778; resigned his military commission in 1779; and, as lieutenant-governor of the state, signed the capitulation when Charleston was taken by Sir Henry Clinton in 1780. Shortly after, in open violation of the terms of capitulation, he was suddenly arrested with 77 other influential public men, hurried on board a prison ship, and conveyed to St. Augustine. He alone of the prisoners refused to enter into any engagements whatever to secure a degree of freedom on parole, and was therefore incarcerated for 42 weeks in the dungeon of the castle of St. Augustine. Being exchanged, he was sent to Philadelphia, and after his return to Charleston, as member of the state legislature, notwithstanding the violence he had suffered, he opposed the confiscation of the property of loyalists. He was elected governor of the state in 1782, but declined the honor, preferring to retire to private life.

GADSDEN, CHRISTOPHER EDWARDS, D.D., grandson of the preceding, third bishop of the Protestant Episcopal church in South Carolina, born in Charleston, S. C., Nov. 25, 1785, died in the same city, June 24, 1852. He was graduated in 1804 at Yale college, where he began a life-long friendship with J. C. Calhoun, was ordained deacon in 1807, and after having charge for 2 years of the parish of St. John's, Berkley, was in 1810 admitted to the priestly office, and elected assistant minister of St. Philip's church, Charleston, with which he was connected during the remainder of his life. It is the oldest church in the diocese, and he became its rector on the death of the Rev. J. D. Simons, in 1814. He was influential in 1810 in establishing the Protestant Episcopal society for the advancement of Christianity in South Carolina, of which he was from the first a trustee, and from 1840 *ex officio* president. On the death of Bishop Bowen, in 1839, there were two parties in the diocese, each of which had its candidate for his successor. Dr. Gadsden was elected on the first ballot by a small majority of the clergy and a large one of the laity. After the adjournment of the convention, he called the clergy around the chancel, and proposed the nomination of some third man upon whom they could all unite, and in whose favor he would most gladly decline the office. The tone

and import of the address had a most conciliatory effect, and resulted in a general acquiescence in his election. He was consecrated bishop at Trinity church, Boston, June 21, 1840, and on Sept. 9 following held his first confirmation in St. Michael's church, Charleston, when 126 persons, more than 20 of whom were colored, became subjects of that rite. On his visitations he was particularly attentive to the colored people, often collecting them for purposes of devotion and instruction, and thus setting an example which was followed with happy effects by his presbyters and deacons. He published several sermons and charges to his clergy, an "Essay on the Life of Bishop Dehon" (1838), and many contributions in the "Gospel Messenger," of which he was editor.

GADSDEN, JAMES, an American statesman, brother of the preceding, born in Charleston, S. C., May 15, 1788, died there, Dec. 26, 1858. He was graduated at Yale college, and was engaged in commerce till upon the declaration of the war of 1812 he solicited a commission in the army. Appointed a lieutenant in the engineer corps, he was variously engaged in Canada and New York, and after the peace was selected as aide-de-camp of Gen. Jackson in the expedition to examine and report upon the military defences of the gulf of Mexico and the S. W. frontier. In the following year he was appointed to review the examinations in coöperation with Gen. Bernard, and published in a separate report conclusions different from those of his associate. In 1818 he accompanied Gen. Jackson in the Seminole campaign, and took part in the capture of St. Mark's, where Arbuthnot was made prisoner; and when Ambrister, the confederate of Arbuthnot, was subsequently arrested at Suwannee, Gadsden at the head of a detachment captured a schooner in the service of the enemy, on board of which was found the correspondence that led to the condemnation and execution of these two leaders of the Indians. At Pensacola he planned the approaches and established the batteries which forced the governor, Massot, to surrender at discretion. At the close of the Indian war he was made a captain, and detailed to take charge of the works to be constructed for the defence of the frontier on the gulf. He was engaged in the fortification of Mobile bay, when he was called to the military staff of Gen. Jackson, as inspector-general of the southern division, with the rank of colonel. He accompanied Jackson to Pensacola when the latter took possession of Florida as governor, and was active in reconciling a dispute between him and the Spanish governor concerning the interpretation of the treaty between the two countries. Upon the reduction of the army in 1822, Col. Gadsden was retained, and for several months was employed as adjutant-general with Mr. Calhoun, who was reorganizing the war department, but for political reasons his name was rejected by the senate. He then became a planter in the wilds of Florida, where

under a commission from President Monroe he effected a treaty for the removal of the Seminoles from middle to southern Florida, and was the first white man who crossed Florida through jungles and morasses from the Atlantic to the gulf. He resumed agricultural pursuits near Tallahassee, but soon became president of the South Carolina railroad, was occupied for several years with commercial enterprises, and afterward engaged in the new culture of rice by tidal irrigation near Charleston. He was recalled to public life by President Pierce, who conferred on him the mission to Mexico, an office which the issues that had grown out of the execution of the treaty of Guadalupe-Hidalgo made one of great difficulty. Disputes had arisen concerning the boundary line between Chihuahua and New Mexico, involving the possession of the Mesilla valley, of which, though claimed by the United States, the Mexicans took armed possession. The 11th article of the treaty, imposing upon the United States the obligation to restrain the Indian marauders on the Mexican frontier, had been neglected, and the reclamations in consequence amounted to between \$15,000,000 and \$30,000,000. Gen. Gadsden concluded a convention, Dec. 30, 1853, by which a new boundary was agreed upon, and by which were secured all the objects which had been erroneously supposed to be attained by the original treaty, the 11th article being abrogated, and a commission provided for the adjustment of claims. For the territory now called Arizona, the United States was to allow Mexico \$10,000,000. Gen. Gadsden was the bearer of his own despatches to the government, and the treaty was finally confirmed by the senate, but with such modifications as made it necessary for the envoy to return to Mexico and renew the negotiation. He had reconciled Santa Anna to the modifications when a revolution drove the dictator from the country, and Gen. Gadsden engaged in negotiations with the new administration when he was superseded, and retired to private life and the pursuits of agriculture, which occupied him till his death.

**GADWALL**, a fresh water or river duck of the sub-family *anatina*, and the genus *chauliastmus* (Gray). In this genus the bill is as long as the head, the lamellæ distinctly visible below its lower edge, and its color black; the head and neck brownish white, each feather spotted with dusky, and the top of the head generally with a reddish tinge; lower neck, breast, back, and sides banded with narrow bars of black and white; rump and tail coverts black; greater wing coverts velvet black, middle chestnut, and speculum white with a black border. From its general color it is often called the gray duck. The length is about 22 inches, the extent of wings 85, and the weight about 1½ lbs. The only species described is the *C. streperus* (Gray), which is generally considered the same in America and Europe; our species presents some slight differences in measurements and coloration, and it may be that a careful exami-

nation would prove the two birds different species, as the general rule, except in a few arctic species, would lead us to believe. It occurs from the fur countries to Texas, in both of which localities it breeds; it is most common in the interior, especially on the larger rivers; it arrives with the widgeon in the vicinity of New Orleans in the autumn, in small flocks, passing the winter in the large lakes near the gulf of Mexico, feeding on small fish, insects, and aquatic grasses; the flesh is considered excellent eating. The gadwall is a good diver and swimmer, and walks uncommonly well; it is a rapid flier, with a whistling noise of the wings; in its excursions on land it nibbles the tender grass, and will eat acorns, seeds, and grain. Experiment has proved that this species is capable of domestication, the peculiarity of the plumage being retained in this condition.

**GAEL**, or **GAIL** (Gaelic, *Gadhel* or *Gaoidheal*), the plural of *Gal* or *Cal* (akin to Latin *celo*, to hide, as the people dwelt or were hidden in forests; or more probably signifying wanderer), the name of the northern and western branch of the great Celtic family of nations, whose other branch is formed by the Kymri or Oymri. The Gael inhabit the Scotch highlands and Ireland, and distinguish themselves as Gael Albinach, or Gael of Albion, and Gael Erinach, Gael of Erin (from *ar* or *iar*, west, and *is*, island; Romanized into Iuerna and Hibernia). Both these divisions are called Erse, the former by the Scotch lowlanders, who derive them from Ireland. The descendants of the Kymri dwelling in Wales are called Gwyddel by the Gael, while those in France are named Breiziz (Britons; see BRETON LANGUAGE), and those of Cornwall (*corn*, *cairn*, rock, and *gal*) ceased in the 18th century to speak their peculiar dialect. *Gadhelic* or *Gaoidhilg* is the epithet especially appropriated to the Irish and to their tongue, and Gaelic especially denotes both the highland Scotch and their language. (See ERSE.) Caledonia is composed of *Cal* and *dun* or *don*, mountain; *Gaeldoch* of *Gael* and *dock*, land; both being names of Scotland; but *Gaoidloch* or strangers' land is the distinctive name of that part of Scotland which is inhabited by non-Celtic people.—It was believed at one time, even by Gibbon, that the Irish were of Punic origin; but Dr. Prichard and others have proved that they, as well as all other Celts, are of the Indo-European family, as having arrived before the Teutons from the regions on the Oxus and from Media, and having penetrated through the Allophyllic races (see FINNS) along the southern shores of the Baltic sea into the west of Europe at a time of which we have no historic data. Traces of this migration, although altered, are found everywhere in the word *Wal* (*Gal*), as in Wales, Wallon, Wallia (Valais) in Switzerland, Wälsch-land (the German name of Italy), Wallachia (the country of the Ruman), in walnut (this tree having been imported from Italy, the northern part of which was Gallia Cisalpina), &c. A. B. Marx has written an interesting treatise on Gaelic

music (in Erach and Gruber's *Encyclopædia*, 1850), showing the influence of the Celts in the countries above mentioned, and in Spain, Galatia in Asia, and even in Africa, as the music of the Moors was found by Lemprier (1789) to resemble the Celtic modes. See also Skene, the "Highlands of Scotland" (London, 1887); Diefenbach, *Celtica* (Stuttgart, 1889-'92); Wilson, the "Archæologic or Præhistoric Annals of Scotland" (Edinburgh, 1851).

GAËTA (anc. *Caieta*), a fortified city of the kingdom of Naples, in the province of Terra di Lavoro, on the gulf of Gaëta, an arm of the Mediterranean, 76 m. S. E. of Rome; pop. of the city proper, about 3,000, but including its suburbs, 14,800. It is neatly though irregularly built. The principal public edifices are the citadel, one of the strongest fortresses in Italy, and the key of the kingdom of Naples; the cathedral, which is a handsome symmetrical structure, with a fine tower; and the royal palace, which is a favorite summer residence of the Neapolitan kings. Gaëta gives title to an archbishop; and thither Pope Pius IX. fled when the republican party obtained supremacy in Rome in 1848.

GÆTULIA, an ancient country of Africa, situated S. of Mauritania and Numidia, bounded E. by hills separating it from the country of the Garamantes, W. by the Atlantic ocean, and S. according to Pliny, by the river Niger. Nearly all of this region was included in the Sahara or great desert, the W. oases of which, and perhaps some portions of the fertile belt on its N. margin and of the basin of the Niger, were inhabited by the Gætuli. They were one of the two great aboriginal races of N. W. Africa, the other being the Libyans, and had formerly dwelt on the coast of the Mediterranean, but were expelled by the Mauritanians and Numidians, and driven S. of Mt. Atlas. They were a nomadic race, of warlike disposition and savage manners, living on milk and flesh, clothed with skins, and without regular government. They are by some supposed to have been the ancestors of the Berbers, and of Asiatic origin. They were divided into several tribes, one of which, the Melanogætuli, were nearly black from intermingling with the Nigræ on the S. In the Jugurthine war they served as cavalry against the Romans, but afterward a body of them joined the army of Marius; and from this period to the close of the civil wars we frequently find them serving as auxiliaries with the legions. They were sometimes however troublesome to the Romans, and in the reign of Augustus an army under the command of Cornelius Cossus Lentulus had to be sent against them. The barbarians were vanquished, and the general obtained a triumph and the surname of Gætulicus.

GAGE, THOMAS, the last royal governor of Massachusetts, born in England, died there in April, 1787. He was an active officer during the 7 years' war, was appointed governor of Montreal in 1760, and succeeded Gen. Amherst in 1788 in the chief command of the British

forces in America. Being appointed to supersede Hutchinson as governor of Massachusetts, he arrived in Boston, May 17, 1774, while the people of that colony were preparing to resist the port act framed for their chastisement. But he was qualified neither to reconcile nor subdue, and, though personally esteemed, inspired the public with neither confidence nor fear. He was instructed to seize and punish Samuel Adams, Hancock, and Warren, but durst not even attempt their arrest. As precautionary measures he seized the powder in the public magazine in Charlestown (Sept. 1), and began to fortify Boston, out of which city his power was at an end. He planned the expedition to Concord which resulted in the first battle of the revolution (April 19, 1775), and on June 12 established martial law throughout Massachusetts, and proscribed Samuel Adams and John Hancock by name, offering pardon to all other rebels who would return to their allegiance. After the battle of Bunker Hill (June 17, 1775) Gage was superseded by Gen. Howe, and sailed for England on the following Oct. 10.

GAGERN, HEINRICH WILHELM AUGUST, baron von, a German statesman, born in Baireuth, Aug. 20, 1799. He entered the army of the duke of Nassau in 1815, and fought at the battle of Waterloo as sub-lieutenant. He afterward studied law, and entered the public service of the grand duchy of Hesse-Darmstadt. As a writer and a member of the legislature he opposed the views of the government, and was obliged to resign his office in 1833, after which he devoted himself exclusively to the diffusion of political liberalism. Being considered the leader of the opposition, he was called upon to form a ministry when the popular outbreak of 1848 compelled the government to adopt a liberal policy. He was elected a member of the national German parliament at Frankfort-on-the-Main, and acted as its president until Dec. 15, when he entered the cabinet of the vicar of the empire (*Reichsverweser*), the Austrian archduke John, as prime minister. In that position he avowedly endeavored to reconstruct Germany upon the basis of an exclusion of Austria. His administration lasted only 3 months. He afterward applied all his influence to the promotion of a plan of a limited German union under the leadership of Prussia. He was justly considered the soul of that party which from a convention held at Gotha in 1849 obtained the name of *Gothaer* (men of Gotha), a moderately liberal party, whose political ideal was the British constitution. After having taken part as a volunteer in the Holstein war against Denmark, Gagern went to Heidelberg, and has since lived there in retirement.

GAINES, EDMUND PENDLETON, an American general, born in Culpepper co., Va., March 20, 1777, died in New Orleans, June 6, 1849. He entered the U. S. army as ensign in 1799, was for many years actively employed in frontier duty, and was instrumental in procuring the arrest of Aaron Burr. About 1811 he resigned

his commission, intending to fit himself for the practice of the law; but at the commencement of the war of 1812 he returned to the army, with which he remained connected until his death. At the battle of Chrystler's field, fought Nov. 11, 1813, he rendered important services by covering the retreat of the American forces with his regiment, the 25th, and he subsequently commanded at Fort Erie when the night assault by the British troops under Gen. Drummond was repulsed. For his conduct during the siege of this place, where he was severely wounded, he was promoted to be brevet major-general, having passed during the war by successive promotions through the inferior grades from lieutenant-colonel upward, and received the thanks of congress and a gold medal. He received similar testimonials from the states of Virginia, Tennessee, and New York. He was subsequently engaged in the Creek and Seminole wars, and held the chief command of the southern military district till 1821, when the western division was assigned him. At the commencement of the Mexican war he called out a large force of the southern militia, without awaiting orders, and without obtaining any result commensurate with the expense, for which he was tried by a court martial, but not censured.

GAINSBOROUGH, THOMAS, an English landscape and portrait painter, born in Sudbury, Suffolk, in the early part of 1727, died in London, Aug. 2, 1788. At a very early age he manifested a taste for drawing. Allan Cunningham says: "At 10 years of age, Gainsborough had made some progress in sketching, and at 12 was a confirmed painter." At the age of 15 he was sent to London and placed under the instruction of Gravelot the engraver and Hayman the painter, and soon began to paint landscapes and portraits. But his position did not improve until his marriage in 1746 with a young lady named Burr, of striking beauty, and a fortune which laid the foundation of her husband's independence. He then resided successively in Ipswich and Bath, and in 1774 returned to London, where some portraits which he painted of members of the royal family at once gave him a name and ample employment. He passed the remainder of his life in London, where Sir Joshua Reynolds, his great rival and friend, had settled before him. In 1768 he was chosen one of the original 36 academicians, and from that time until 1784 he sent numerous pictures to the academy, excepting during the 4 years from 1778 to 1777, when, as was supposed, some dispute with Sir Joshua Reynolds deprived the academy of his contributions. It is said that Chatterton sat to him during this interval, and that the portrait was a masterpiece. As a landscape painter Gainsborough achieved the highest excellence, and was the first of his class in England to show any real originality. The "Life of Thomas Gainsborough," by George William Fulcher, edited by his son, appeared in London in 1856.

GAIUS, or CAIUS, a Roman jurist, who flour-

ished during the reigns of the emperors Hadrian, Antoninus Pius, and Marcus Aurelius. Of his personal history little or nothing is known, and even the spelling of his name has been a subject of controversy. From references in the Digest it would appear that he was the author of upward of 15 works, of which the Institutes was by far the most important. This is supposed to have been the first work of the kind not compiled from previous sources, and to have afforded the first instance of a popular manual of Roman law in the sense of modern elementary text books. Such was the estimation in which it was held that after a lapse of 4 centuries from the period of its publication it was incorporated almost bodily into the celebrated Institutes prepared by the order of Justinian. The fame of Gaius as a legal writer, although amply sustained by the latter work, is established on a firm basis by the accidental discovery of a nearly perfect copy of his original treatise, supposed to have been lost after the promulgation of Justinian's compilation. In 1816 Niebuhr in a transient visit to Verona examined a palimpsest in the cathedral library, containing 251 pages, of which one detached and undefaced leaf of 2 pages had been described and partly published by Scipio Maffei 60 years before, with a conjecture that it was part of a compendium of Justinian's Institutes. With this exception the whole original manuscript had been washed and sometimes scratched out and overlaid with the epistles of St. Jerome, and 63 pages had been written over a second time; yet Niebuhr succeeded in restoring and deciphering a portion of it, and at once concluded that it was a treatise of some ancient jurist of celebrity, probably Ulpian. He communicated the results of his labors to Savigny, who published them, together with a learned note suggesting that the ancient text of the parchment was the lost Institutes of Gaius. The sensation caused by these investigations induced the royal academy of Berlin in 1817 to send two accomplished civilians, Göschen and Hollwegg, to Verona, who, after incredible labor in deciphering the characters on the parchment, succeeded in making a transcript of the original writing with the exception of 8 leaves and a few scattered passages which were illegible. A comparison of the work thus recovered with the quotations in the Digest, and its agreement with the Institutes of Justinian, confirmed Savigny's conjecture, and the discovery, by clearing up difficulties in the interpretation of ancient jurisprudence before regarded as hopeless, has been considered to form an era in the study of Roman law. Several editions of the text have been published, that of Göschen of 1842 being considered the best; and commentaries on detached portions by Van Assen, Heffler, Klenze, Böcking, and others, have appeared; but no edition of the whole work with a good commentary has yet been published.

GAJ, LJUDEVIT, a Slavic journalist, born in Croatia about 1810, studied in Hungary and



Germany, and after having visited St. Petersburg, became one of the chief agitators for a national union of the south-Slavic tribes. He established a national printing office in Agram, introduced a new system of uniform orthography for the Croatian, Slavonian, and Dalmatian dialects, called collectively the Illyrian language, and commenced in 1835 the publication of the "Croatian News." In the following year this paper assumed the title of "Illyrian News," but when the south-Slavic movement, though exceedingly effectual as a counterbalance to the national movement of the Magyars, seemed to become threatening to the interests of Austria, the appellation Illyrian was prohibited, and Gaj styled his journal Croato-Slavono-Dalmatine. In 1848, after the outbreak of the revolution in Austria, Gaj headed a deputation to the emperor, and returned from Vienna with the title of councillor. He continued his agitation against the Magyars, and was elected to the Slavic congress of Prague by the high school of Agram. In consequence of renewed political activity, which appeared untimely to the government, he was arrested for some time in 1853. He is also popular as a poet.

**GALACTOMETER** (Gr. γαλα, gen. γαλακτος, milk, and μετρον, measure), an instrument for determining the specific gravity of milk, as an indication of its quality. The common hydrometer may be used for this purpose, but a better instrument is that called the centesimal galactometer, invented by M. Dinocourt. This is a glass tube made to float upright in the liquid, and surmounted with a stem upon which are two scales, one intended to be used in skim milk, the other in milk from which the cream has not been removed. The normal range of each quality is designated upon one of the scales, and the divisions above are intended to mark hundredths of water that has been added. Though the specific gravity of genuine milk commonly is found between 1.026 and 1.031, the determination of this is a very uncertain test of its purity. Cream being specifically lighter than milk, its removal leaves the fluid comparatively heavier; water might be added to this, and the specific gravity be thus brought to that of genuine milk. The instrument therefore should be used only in connection with another called the lactometer, the object of which is to determine the proportion of cream present. This being known, and the specific gravity ascertained with the accuracy due to the graduation of the galactometer, the quality of the milk can be more correctly determined than by the use of other instruments.

**GALAM, or KAJAAGA**, a country of West Africa, in Senegambia, intersected by the parallel of 14° 45' N. and by the meridian of 13° 10' W. It consists of a narrow but densely populated strip along the left (S. W.) bank of the Senegal river, bounded S. by Bondoo and Bambook, and divided by the Faleme into 2 parts, the W., called Lower Galam or Goye, and the E., Upper Galam or Kamera. It is a

mountainous region, abounding in fine scenery, and favored with a fruitful soil and fertilizing streams. The lion, elephant, wild boar, ape, hippopotamus, and crocodile are among its indigenous animals. The inhabitants, who occupy a string of towns on the Senegal, are mostly Serawollis. They are described as a robust, agricultural people, not ignorant of trade, and largely employed as carriers. They exchange the products of the country for European goods, and at one time Galam, or Fort St. Joseph, their capital, was the centre of an active commerce with the French and an important slave depot. Pagan worship is gradually giving way to Mohammedanism; every town has its mosque and priests, and the latter form the wealthiest and most respectable class of the nation. Honesty is a virtue little understood; the boundless exactions of the native chiefs, dignified by the name of customs, have doubtless contributed more to the destruction of commerce than almost any other cause; but in other respects their treatment of whites is friendly. The government is in the hands of a ruler called the *tunka*, whose power, however, is limited by a representative assembly. He derives his authority by collateral succession. The country was visited by Mungo Park in 1795-'6.

**GALAPAGOS ISLANDS**, a group of islands in the N. Pacific ocean, comprising 11 of considerable size and a great number of islets, about 600 m. from the coast of Ecuador, to which state they belong. They lie between lat. 1° 30' S. and 0° 44' N., and between long. 89° 20' and 92° 10' W. The largest of the group, Albe-marle island, is 75 m. long and about 15 m. broad, and its highest summit is, according to Humboldt, 4,686 feet above the level of the sea. These islands are all of volcanic origin, and of comparatively recent formation. Their general appearance is not at all inviting, but in the interior of Charles island is an extensive plain, cultivated by convicts, and producing luxuriant crops of tropical fruits and vegetables. These islands so abound in elephant or land tortoises, which in Spanish are called *galapagos*, that they have derived their name from them. In 1882 the republic of Ecuador converted Charles island into a penal settlement, and sent thither a small colony. When Capt. Fitzroy visited it in 1835, there were 80 houses and some 200 souls, chiefly convicts, on the island. Humboldt in his "Cosmos" says: "Scarcely anywhere else, on a small space of barely 120 or 140 geographical miles in diameter, has such a countless number of conical mountains and extinct craters (the traces of former communication between the interior of the earth and the atmosphere) remained visible. Darwin calculates the number of the craters at nearly 2,000. When that able observer visited the Galapagos in the expedition of the Beagle under Capt. Fitzroy, two of the craters were simultaneously in a state of igneous eruption. On all the islands, streams of a very fluid lava may be

seen, which have forked off into different channels and have often run into the sea. . . . On the largest and most westerly island of the Galapagos group, Albemarle, the cone mountains are ranged in a line and consequently on fissures. The western bay, in which the peak of Narborough, so violently inflamed in 1825, rises in the form of an island, is described by Leopold von Buch as a crater of upheaval, and compared to Santorino. Many margins of craters on the Galapagos are formed of beds of tufa, which slope off in every direction. A part of what in the old descriptions is called tufa, consists of palagonite beds, exactly similar to those of Iceland and Italy, as Bunsen has ascertained by an exact analysis of the tufas of Chatham island, the most easterly of the whole group."

**GALATIA**, a province of Asia Minor, lying N. E. of Phrygia, of which it was once a part, and called Gallo-Græcia or Galatia from the Gauls, who, having left the army of Brennus, conquered this region and settled in it. No ancient geographer has laid down with precision the limits of Galatia. Its inhabitants, though intermixed with the Greeks, still retained their native language down to the days of the apostle Paul. Callimachus calls them "a foolish people;" and Hilary, himself a Gaul, as well as Jerome, speaks of them as unteachable. Though marked by that warmth and volatility of character for which the Gauls in all ages have been noted, they were less effeminate and less debased by superstition than the natives of Phrygia, and therefore more ready to receive the gospel when it was made known to them. Paul first preached Christianity and organized churches in Galatia. He was there once with Silas and Timothy (Acts xvi. 6) about A. D. 53, and again, several years later, on his return from Corinth (Acts xviii. 23).

**GALATIANS**, EPISTLE TO THE, addressed by St. Paul to "the churches of Galatia," and forming one of the canonical books of the New Testament. There is little evidence and much diversity of opinion as to when and where it was written. In the Galatian churches were many Hebrew converts, who had incorporated Jewish rites with the ordinances of Christian worship. Some of them seem even to have questioned the divine commission of Paul, with a view of exalting the authority of Peter, who was believed to be at variance with him concerning the relation of the Jewish to the Christian ceremonial. To recall the Galatians to the simplicity of the gospel was the object of Paul in this epistle, in which he vindicates his apostolic commission (i., ii.), urges the doctrine of salvation as the cardinal truth of Christianity, illustrates the relation of the Christian to the Jewish church (iii., iv.), and concludes with exhortations and benedictions.

**GALATZ**, or **GALACZ** (anc. *Asiopolis*), a town and the only port of Moldavia, capital of the district of Kovourloni, on the Danube, just below the mouth of the Sereth; pop. about 86,000. It is an important commercial town, one of the two

ports on the Danube open to foreigners, and an entrepot for most of the traffic between Germany and Constantinople. Steam packets ascend the river to Vienna, and a line of vessels established by the Austrian Lloyd company connects Galatz with Trebizond and Constantinople. In 1847 steamboat communication was also opened with Odessa. Galatz is a free port, is accessible by vessels of 300 tons burden, and though distant about 80 miles from the sea promises to become the chief emporium on the Danube. Since the removal of many oppressive commercial regulations in 1829 it has made great advances. It exports wheat, maize, barley, tallow, hides, skins, bristles, bones, jerked beef, lard, butter, wool, linseed, yellow berries, barilla, coarse cheese, timber, &c., and imports cotton goods, iron, steel, hardware, sugar, coffee, olives, and olive oil. The value of the exports, chiefly maize, in 1856, was about \$4,000,000, and of the imports \$5,000,000. The trade was formerly monopolized by the Greeks, and is still chiefly in their hands, although the English and other merchants now participate in it more than formerly. Galatz consists of an old and a new portion, the former of which is dirty, ill built, and crowded with miserable wooden huts. The latter has a number of handsome stone buildings, Greek churches, a convent, a hospital, and a large bazaar. A battle was fought here between the Turks and Russians in 1769; the Russians took the town in May, 1789; and the Turks gained a victory here in August of the same year. Between 1848 and 1856 Galatz was on several occasions occupied by Turkish, Russian, and Austrian troops.

**GALAXY** (Gr. *γαλαξίας κύκλος*, milk circle, the milky way), an irregular band of whitish light surrounding the heavens, stretching in winter evenings from S. E. to N. W., in summer from S. W. to N. E., and caused, as may be seen with telescopes of low power, by numerous stars too faint to be seen singly by the naked eye. It is the almost unanimous opinion of astronomers that this faintness arises chiefly from distance, so that the sun and the fixed stars may be considered as the central portion of an immense flat cluster of stars whose circumference is the milky way. Other specimens of such clusters of stars, it is believed, are visible in some of the great nebulae.

**GALBA**, **SERVIVS SULPICIUS**, a Roman emperor, born near Terracina, Dec. 24, 3 B. C., died Jan. 15, A. D. 69. Inheriting great wealth and possessing great talents, it was predicted both by Augustus and Tiberius that he would become the head of the Roman world. He attained the prætorship in A. D. 20, and the consulship in 38, carried on a war in Gaul in 39 against the Germans, was intrusted with the administration of Africa in 45, lived in retirement for several years under Nero, but in 61 was invested with the government of Hispania Tarraconensis. He was faithful to the empire till in 68 Vindex rebelled in Gaul, and his own assassination was plotted by Nero. He then

took the title of legate of the Roman senate and people, marched toward Rome, and upon the death of Nero received the imperial dignity from the senate. He offended the prætorian guard by refusing the donative which had been promised in his name, and completed his ruin by adopting Piso, a noble young Roman, for his successor. Otho, who had hoped for the adoption, immediately formed a conspiracy among the soldiers, and Galba was murdered in the forum 7 months after the beginning of his reign.

**GALBANUM**, a gum resin obtained from India and the Levant. The tree which produces it is not known with certainty. On doubtful authority it has been referred to the *bubon galbanum* of the eastern coast of Africa, to the *ferula ferulago* of Linnæus, and the *F. galbanifera* of Lobel. Lindley named the tree from which he supposed it came *opoidia galbanifera*, and Don from some seeds found in the gum proposed a new genus, *galbanum*, with the specific name *officinale* for the tree producing the gum, or rather the seeds found in it. A German traveller, F. A. Buske, saw the galbanum plant growing on the shores of the Caspian with the gum exuding from it, and according to his description it is a *ferula*, very similar to the *F. erubescens* of Boissier, if not this species. The drug is imported in massive lumps of irregular shapes, apparently made up of agglutinated tears. They are of brownish yellow color, sometimes greenish, the tears sometimes translucent and of a bluish or pearl white color. Its consistency in cold weather is that of wax; in warm weather it is soft and adhesive, and at 212° F. it can be strained, a process requisite to separate the stems and other impurities with which it is commonly mixed. When quite cold it is brittle and may be pulverized. The taste of galbanum is bitterish, hot, and acrid, and its odor balsamic, peculiar, and disagreeable. It is wholly soluble, except impurities, in dilute alcohol; less so in ether. Its specific gravity is 1.312; and its composition, by the analysis of Meissner, is as follows: resin, 65.8; gum, 22.6; bassorin, 1.8; volatile oil, 8.4; bitter matter with malic acid, 0.2; vegetal remains, 2.8; water, 2; loss, 1.4; total, 100. An essential oil is obtained by distillation, of a fine indigo blue color, which it imparts to alcohol. Varieties of galbanum of somewhat different qualities are occasionally met with. The uses of galbanum are medicinal, rarely as an internal remedy, though it possesses stimulant, expectorant, and antispasmodic properties, on account of which it is sometimes prescribed in catarrhs, chronic rheumatism, &c. Its most useful application is in the form of a plaster, alone or in combination with other substances, for promoting resolution or supuration of indolent swellings.

**GALEN (GALENUS)**, CLAUDIUS, a physician of antiquity, born in Pergamus in Mysia, A. D. 180, died, according to Suidas, in 200 or 201, but according to his Arabic and some other biographers, from 10 to 18 years later. Galen received the rudiments of his education from his father, and

when 15 years of age he began to study logic and philosophy. Two years afterward he was placed under the best instructors in the science of medicine; and at about the age of 20, after the death of his father, he travelled into various countries to complete his studies. He was absent 9 years from Pergamus, and when he returned he was appointed city physician to the school of gladiators. Some popular commotions having arisen in Pergamus a few years after his appointment, he went to Rome, where he remained 4 years and acquired great reputation for skill in anatomy and medicine. As soon as the troubles in Pergamus had passed away, Galen hastened back with the intention of remaining there; but hardly had he reached his destination when he was summoned by the emperors Aurelius and Verus to attend them at Aquileia in Venetia, where a fearful pestilence raged in the camp. The emperors set out for Rome shortly after Galen presented himself. Verus died of apoplexy on the way, and Galen accompanied Aurelius to the capital. When returning to the camp after the apotheosis of his colleague, Aurelius urged Galen to accompany him, but the latter declined under pretence that Æsculapius had enjoined him to remain. How long he sojourned in Rome during his second visit is uncertain, but while there he continually added to his fame by his lectures, writings, and successful practice. We know little more of his latter days than that he ultimately returned to his native city, and died there. Galen was not only the most eminent physician, but also one of the most learned and accomplished men of his age. He was a very voluminous writer on medical and philosophical subjects. There are still extant 88 treatises of his, and 15 of his commentaries on various works of Hippocrates, beside the fragments of his lost works and those writings which are falsely attributed to him. The best edition of his works is that by Kühn, which appeared at Leipzig, 1821-'33, in 20 vols. 8vo. Writings attributed to him were discovered and published in Paris by Minas in 1844, and by Daremberg in 1848.

**GALENA**, sulphuret of lead, the ore which furnishes most of the lead of commerce. It occurs in highly crystalline masses, which separate into cubical fragments. Its structure is also granular, and sometimes fibrous. Freshly fractured, it presents a brilliant lustre like polished steel, which changes by exposure to a dull lead-gray color. Its hardness is from 2.5 to 2.75; its specific gravity 7.25 to 7.7. Its composition, represented by the symbol PbS, is lead 86.6, sulphur 13.4; but it often contains other metals, as antimony, silver, zinc, iron, and copper, as well as the substance selenium. It is also largely intermixed with the earthy gangues that form the principal portion of the veins in which it is found. From these, and from the sulphurets of zinc and the pyritous copper and iron usually associated with the ore, it is separated as far as practicable before smelting by the processes of stamping or crushing, jigging, &c. (See LEAD,

and METALLURGY.) In some veins and beds it is frequently found in large groups of cubical crystals, which are very free from mixtures with foreign substances. In this form it is met with in the fissures in the limestone of the lead region of Wisconsin, Iowa, and Illinois, imbedded in the clay with which the fissures are filled. Galena is a valuable ore for the silver it often contains, as well as for the lead. In reducing the ore by smelting, the silver all goes with the lead, which is run out; and from this it is afterward separated either by the process of cupellation, or parting by crystallization, or other method. The lead ores do not, however, all contain silver enough to render its extraction profitable; and of those worked in the United States, only the ores of Davidson co., N. C., are sufficiently argentiferous for the separation of the silver to be an object, and yet the separation is so cheaply conducted that 3 oz. of silver to the ton of lead will pay for the operation. Galena much richer in silver than this is a product of numerous veins in the granitic and metamorphic rocks of New England and other parts of the United States; but the more argentiferous it is, the less certain is the yield of the veins in quantity, and none of this character has been found profitable to work. In Cornwall and Devonshire, England, mines of argentiferous galena have been worked profitably for centuries, even when a product of 9 or 10 oz. of silver to the ton of silver-lead was required to pay the expense of separation. The richest metal was from the ores of mines near Beer Alston in Devonshire, which yielded from 80 to 120 oz. of silver to the ton of lead; one portion of the mines, known as the South Hooe, yielded lead containing 140 oz. of silver to the ton. These mines, though now of little importance, were celebrated for their production in the time of Edward I. and II. Other mines produce, some 40, some 50, and some 70 to 100 oz. of silver. In Ireland the product of the lead ores in silver in 1851 was 3,860 oz. of the value of £1,029 6s. 8d. The average yield of the lead was 7 oz. to the ton. The lead from the mine of Shallee yielded 25 oz., of Luganure 8 oz., of Ballyhickey 15 oz., and of Kilbricken 120 oz. Argentiferous galena is a common product of mines upon the continent of Europe, and also of Mexican mines. Among the localities in the United States where it is met with are Shelburne and Eaton, N. H., the lead obtained from the ores of each locality yielding from 3 to 7.53 lbs. of silver to the ton; Middletown, Conn., 40 to 70 oz.; Uxbridge, Mass., a specimen from one of the small veins of which yielded at the rate of 18.53 lbs. troy to the ton; Ancram, Columbia co., N. Y., 25 to 30 oz. to the ton of lead; Ellenville, Ulster co., N. Y., 12 oz.; Phoenixville, Chester co., Penn., 25 to 37 oz. The mines at all these localities have been abandoned.

GALENA, a city of Illinois, county seat of Jo Daviess co., and the centre of the region known as the "Galena lead mines," situated upon both sides of Galena river, 8 m. from its

junction with the Mississippi, 468 m. above St. Louis, and 406 below St. Anthony; lat. 42° 22' N.; pop. in 1882, 1,000; in 1841, 2,225; in 1850, 6,004; in 1859, 14,000. The first house was built at Galena in 1819, the place at that time being known as La Pointe or Frederic's Point. In 1827 a village was laid out by Capt. Martin Thomas of the U. S. army, and named Galena, that being the name of the sulphuret of lead which abounds in the locality. In 1828 the first newspaper was established, entitled the "Miner's Journal," and in the same year the village comprised about 100 houses. The city has a high and healthy location, far enough removed from the Mississippi to be entirely free from the miasmatic exhalations of the river, and yet sufficiently near to enjoy all its commercial advantages. Galena river is always navigable for any steamboats that can ascend the rapids of the Mississippi. The ground upon which the city is built rises abruptly at a short distance from the river on both sides, and some of the bluffs reach a height of upward of 200 feet. These bluffs, which encircle the whole city, are composed of mountain limestone, and give the place an extremely irregular and picturesque appearance. In the environs are many streams of water, which afford ample power for manufacturing purposes. On these streams are 12 or 15 mills. The public and private buildings of Galena are mostly of brick, and many of them in a good style of architecture. There are 12 churches, 2 daily newspapers, 10 public school-houses with 1,500 scholars, a seminary, a U. S. marine hospital, and a custom house and post office built of stone at a cost of \$70,000. There are 3 large steam saw mills, 1 large steam flouring mill, 2 lead furnaces, 2 iron foundries and machine shops, 2 extensive plough manufactories, 5 wagon shops, 2 large furniture manufactories operated by steam, 1 pottery, 8 lumber yards, 3 large leather furnishing houses, 3 soap and candle manufactories, 7 breweries, and 2 carriage manufactories. Two daily lines of steamboats run to St. Paul and St. Anthony, and intermediate points, and 2 daily lines to St. Louis; and there are 4 daily passenger and 2 freight trains of the Illinois central railroad. Galena is 8 hours from Chicago, 18 from St. Louis, 24 from Cincinnati, and 48 from New York. The steamboat tonnage owned there amounts to 4,962 tons, and there were 490 arrivals and departures of steamboats in 1857. The exports of lead in 1857 were valued at \$801,324, while the value of horses, cattle, grain, flour, potatoes, pork, and bacon exported was \$839,014. The total amount of lead shipped from the Galena mines from 1821 to 1858 was 820,622,839 pounds, the value of which was \$82,824,918. The greatest amount in any one year was in 1845, when 54,494,850 pounds were shipped. In 1857 the amount shipped was 34,183,250 pounds.—The Galena mines will be described in the article LEAD.

GALERIUS, CAIUS VALERIUS MAXIMIANUS, a Roman emperor, reigned from A. D. 305 to 311.

A native of Dacia and the son of a peasant, he distinguished himself in the armies by his courage, and was appointed Cæsar in 292 by Diocletian, whose daughter he married. Receiving Thrace and Macedonia for his province, he was defeated by the Persian king Narses, but was so disdainfully received by the emperor at Antioch on his return that he again set out, crossed the Euphrates, and gained a decisive victory over the Persian king. His power was now such that he extorted from Diocletian an edict of proscription against Christianity, which was bloodily executed. After the abdication of Diocletian in 305 he reigned over the East; but when Italy recognized the authority of the usurper Maxentius, he marched thither to besiege Rome, which he had never yet seen, but was defeated by Maxentius, and died at Sardica.

GALES, JOSEPH, an American journalist, born in England about 1760, died in Raleigh, N. C., Aug. 24, 1841. He was originally a printer and bookseller at Sheffield, where he founded and published the "Sheffield Register." His sympathy with the French revolution and his republican principles involved him in difficulty with the government, and in 1798 he sold his journal to James Montgomery the poet, and emigrated to the United States. He settled in Philadelphia, which was then the seat of the federal government, where he conducted the "Independent Gazetteer" for 2 or 3 years. He was the first to introduce the practice of reporting by short hand the debates in congress. In 1799 he sold the "Independent Gazetteer" to Samuel Harrison Smith and removed to Raleigh, N. C., where he established the "Register," which he conducted for nearly 40 years.—JOSEPH, son of the preceding, also an American journalist, born April 10, 1786, in Eckington, near Sheffield, accompanied his father to the United States at the age of 7 years. He was educated at the university of North Carolina, went to Philadelphia to learn the art of printing, and in 1807 settled at Washington as the assistant and afterward as the partner of Samuel Harrison Smith, who in 1800 had removed the "Independent Gazetteer" to Washington and changed its name to the "National Intelligencer." In 1810 Mr. Smith retired from business, and Mr. Gales became sole proprietor of the journal, which was at that time published tri-weekly. In 1813 he took into partnership his brother-in-law, Mr. William W. Seaton, and in Jan. 1813, began to issue the "National Intelligencer" daily. The journal is still conducted and published by Gales and Seaton.

GALESVILLE, the capital of Trempealeau co., Wisconsin, situated on Beaver creek, 6 m. E. of the Mississippi river, 20 m. N. W. of the city of La Crosse, and 12 m. E. of the city of Winona, Minnesota; pop. in 1858, about 500. The village plot was first laid out in the summer of 1854 by the Hon. George Gale, the proprietor of the land on which it is situated. It is the seat of Galesville university, chartered by the legislature of the state in 1854. It has an en-

dowment of \$44,000, of which \$32,000 were given by the Hon. George Gale. A stone edifice for the normal department was erected in 1858 at a cost of \$10,000. It is under the patronage of the Methodist Episcopal church, which nominates one-third of the board of trustees.

GALIANI, FERDINANDO, a Neapolitan author, born in Chieti, Dec. 2, 1728, died in Naples, Oct. 30, 1787. He received a learned education, devoting himself especially to antiquities and political economy. He wrote in his 16th year a remarkable dissertation upon the money current at the siege of Troy, and soon after revenged himself for a slight from the Neapolitan academy by publishing a collection of addresses in prose and verse upon the death of an executioner, after the manner of the academical eulogies. In 1750 he published an ingenious treatise on money, which gained him the friendship of the leading savants and statesmen of Italy and admission into the academy *della Crusca* of Florence. In 1760 he went as secretary of legation to Paris, where he remained 10 years, and became associated with the principal personages of the time in philosophy and letters. He wrote in French in 1770 his *Dialogues sur les blets*, a work which had great success; but as it took part against the economists who were favored by Choiseul, the latter demanded his recall. His brilliant wit and his vast erudition made Voltaire say that Plato and Molière seemed to be united in him. He returned to Naples, received important civil offices, composed a life of Horace with extracts from his poems, and a philosophic comic opera entitled the "Imaginary Socrates." In his various poems and short novels he is often not inferior to Rabelais.

GALIANO, ANTONIO ALOALA, a Spanish author and politician, born in Cadiz, July 22, 1789. He is the son of a distinguished naval officer who fell in the battle of Trafalgar, took an active part in the revolt which resulted in the constitution of 1820, became in 1821 a member of the cortes, and one of the principal and most eloquent orators of the liberal party, but in 1823, after the French intervention under the duke of Angoulême, he was compelled to take refuge in England and resided there 7 years, familiarizing himself with the English language, and writing for the leading English reviews. He was appointed the first professor of the Spanish language and literature of the London university (1828), and published in the "Athenæum" (1834) a "History of Spanish Literature in the 19th Century," which attracted considerable attention. He left England in 1830, but was not permitted to return to Spain till 1834. He has since been again compelled to resort to flight on several occasions, but while in Madrid he was reelected to the cortes, and held other offices, and at the same time exerted much influence as a journalist, chiefly as a writer for the *Piloto*, which he had established in concert with Juan Donoso Cortes. He has translated into Spanish Dr. Dunham's "History of Spain," and Thiers' "History of the Consulate and the Empire."

GALICIA (Ger *Galizien*, Pol. *Galicja*), a crownland or province of Austria, now consisting of the kingdom of Galicia and Lodomeria, the duchy of Auschwitz (Oswiecim) and Zator, and the grand duchy (late republic) of Cracow, lies between lat. 47° 50' and 50° 40' N., and long. 18° 54' and 26° 31' E., and is bounded N. by Russian Poland, from which it is in part separated by the Vistula, E. by Russia, S. by the Bukowina, or duchy of Czernowitz, and Hungary, being separated from the latter by the Carpathian ridge, and W. by Austrian and Prussian Silesia; area, 80,157 sq. m.; pop. about 5,700,000. Its S. part is occupied by the N. branches of the Carpathians, which in some parts rise to a height of about 6,000 feet, and in some peaks above 8,000; the central region is hilly; the N. belongs to the great Polish plain. From the Carpathians and their offshoots descend all the rivers which cross the country, flowing mostly in a N., and partly in a S. E. direction. Those flowing N., the Biala, Sola, Skawa, Raba, Dunajec, Wisloka, San (which divides the country into two unequal parts), and the Bug, are tributaries of the Vistula; the Pruth and the Dniester flow S. E., the former to the Danube, the latter, with its affluents the Stry, Sered, and Podhorce, to the Black sea. There are some marshes in the N. E. part of the plain, and numerous mountain lakes, called "eyes of the sea," in the Carpathians, some at heights of 3,000 to 4,000 feet; sulphurous and other mineral springs abound in the valleys. The climate is healthy but cold, the country being exposed to the winds from the E. and N., and closed against those from the S.; the winters are long. The soil is varied, only the lower region, where loam and sand prevail, being productive, and in some places fertile; the mountains are rocky and sterile, or wooded. The principal products are wheat, rye, barley, oats, maize, potatoes, peas, beans, and other common vegetables, chicory, clover, flax, hemp, anise seed, rape, tobacco (which is monopolized by the government), hops, pears, apples, cherries, plums, and various other fruits, which are greatly inferior in quality to those of Hungary. There are few vineyards, and these yield no wine, the climate being too rough for the culture of the grape. The pine prevails in the forests, but the oak and beech also grow to an imposing size. Honey and wax, potash and tar, are made in large quantities. The rivers are rich in various kinds of fish. Among the wild animals are the wolf, fox, stag, hare, lynx, and bear, the wild goose, heron, swan, eagle, and vulture. The chief mineral productions are iron, which is found along the whole line of the Carpathians, salt, mostly from the celebrated rock salt mines of Wieliczka and Bochnia in the vicinity of Cracow, and partly from saline springs in the eastern parts of the country, sulphur, produced chiefly at Swosowice, and naphtha; but coal, lead, copper, zinc, silver, and gold are also found. The inhabitants are mostly Slavi, of Polish (including the Mazura, W.

of the San, and Gorale, or western mountaineers) and Ruthenian race; but Jews, Germans, Armenians, and gypsies are also numerous. The nobility are mostly of Polish descent, vivacious, warlike, and ardently attached to their nationality; the peasants are hardy, rude, filthy, intemperate, sluggish, and slavish; the Jews, who are very numerous in the cities, of which they often form half the population, are, with few, sometimes brilliant exceptions, ignorant, bigoted, distinguished by a peculiar half oriental dress and an unpleasant German jargon, and treated with the utmost intolerance. Education, agriculture, and industry are still greatly neglected; wealth is rare; excessive misery, especially among the Jews and mountaineers, a frequent occurrence. Distilleries abound in the villages, and stores and trading shops in the town quarters of the Jews, who before the revolution of 1848 were excluded by the government from both cities proper and villages. The chief manufactures are linen, woollens, paper, wooden utensils, tobacco, leather, potters' ware, and glass. Commerce is limited and carried on mostly by Jews, the chief commercial cities being Cracow, Brody, and Lemberg, the capital. The chief exports are cattle and horses, grain, salt, timber, potash, skins and hides, and wool. Brody is an emporium for the transit trade with Russia. Other considerable towns are Zloczow, Tarnopol, Czortkow, Zolkiew, Brzezany, Stanislawow, Kolomea, Przemyśl, Sambor, Stry, Rzeszow, Sanok, Tarnow, Jaslo, Bochnia, Sandec, and Wadowice—all, as well as Lemberg, capitals of circles of the same names—Jaroslaw, Dukla, Trembowla, and Halicz, from the last of which the country derives its name. The principal existing divisions are those of Cracow, Lemberg, and Stanislawow. The chief courts of justice (*Oberlandesgerichte*), as well as the two universities of the province, and other principal institutions, are at Lemberg and Cracow. The Roman Catholics, about 2,200,000, have bishops at Przemyśl and Tarnow, and an archbishop at Lemberg; the members of the Greek united church, about 2,050,000, mostly Ruthenians, have a bishop at Przemyśl; the non-united Greeks, mostly Moldavians, belong to the bishopric of Czernowitz; the Armenians have an archbishop at Lemberg; the Protestants have a superintendent in the same city; the Jews, about 850,000, have no hierarchical centralization. The literary productions of the country, mostly in Polish, are scanty; a few journals and magazines appear at Cracow and Lemberg; various Hebrew periodicals have lately been commenced. Galicia is the only large division of the empire which has no regular fortresses; transportation of troops, however, is facilitated by good roads, as well as by extensive railway lines, which will soon connect Cracow and Lemberg with each other and with all the principal cities of the empire.—The earliest regular settlement of Galicia was by the Ruthenians (Pol. *Rusini*), who now occupy the eastern division, also called Red Russia. This

was occupied toward the end of the 9th century by the Magyars, then passing to Hungary. Lodomeria, E. of modern Galicia, and then connected with it, was subdued by the Russians at the beginning of the 11th century. Various principalities, the chief of which was Halicz, were formed in the following period under the protection of the kings of Hungary. About the middle of the 13th century Galicia was annexed to Lithuania, in the early part of the 14th to Moscow, and after the death of the last prince of Halicz (1840) to Poland, under the reign of Casimir the Great. From that time it shared the destinies of the latter country, down to the time of its first division in 1772, when it was taken by the empress Maria Theresa, on the ground of the old claims of the crown of Hungary to its possession. It received the title of kingdom of Galicia and Lodomeria, though Lodomeria was in the possession of Russia. The last division of Poland (1795) brought new fragments of Poland into the possession of the Hapsburgs, and the province was divided into E. and W. Galicia. A part was ceded in 1809 to the duchy of Warsaw, and was afterward annexed to Russian Poland; another part was converted by the treaty of Vienna into the republic of Cracow (1815), and was annexed to Austria after the Polish rising of Feb. 1846, which was suppressed in Galicia through a frightful slaughter of the nobility by the peasantry. Insignificant attempts at insurrection were made in the spring of 1848 at Cracow and Lemberg. Several conspiracies have since been detected and severely punished. The Bukowina has been separated from Galicia since the beginning of the reign of Francis Joseph.—For further particulars see the articles on AUSTRIA, CRACOW, and POLAND, to which latter head the history of Galicia chiefly belongs.

GALICIA, a province in the N. W. of Spain, comprising the 4 modern subdivisions of Corunna, Lugo, Orense, and Pontevedra, bounded N. and W. by the Atlantic, S. by Portugal, and E. by the Asturias and Leon; area, about 17,000 sq. m.; pop. in 1857, 1,891,878. It is intersected by numerous narrow valleys, and is mostly mountainous, as the western continuation of the Cantabrian range spreads over the greatest part of the province, and watered by numerous torrents, streams, and rivers. The most remarkable of the latter are the Minho, with its affluents the Sil and the Tea, the Lerez, the Ulla, and the Tambrá, which all become navigable in their lower course and empty into the Atlantic, forming there wide estuaries, or rias, and safe harbors. The coast, being rugged and more broken than those of the Asturias and Biscay, owing to the violent currents of the Atlantic in these latitudes, presents many deep inlets and lofty promontories. Among its excellent harbors are those of Ferrol, said to be the best in Europe, and Vigo, the principal port on the western coast. The climate is cold in the interior and the more elevated regions, temperate in the lower country and

along the coast. The proportion of arable land is very limited. The soil produces flax, maize, barley, wheat, and an abundance of fruits, which constitute the main food of the population; the best oranges and wine are found in the S. part. Fishing and navigation form a principal part of the industry of the people, who also manufacture linen for domestic use. The inhabitants, called Gallegos, are a hardy and robust people, and speak a dialect greatly differing from the common Spanish. About 100,000 of them yearly leave their country, supplying the larger cities of Spain and Portugal with porters and servants, and the neighboring provinces with hands for the harvest. They return with their earnings after a longer or shorter absence, during which their wives perform the work in the house and the labor in the field. The chief towns are Corunna, the capital, Ferrol, Vivero, Pontevedra, Vigo, Mondonedo, Lugo, Santiago de Compostella (the ancient capital), and Orense.—Galicia was in antiquity the country of the Artabri and a section of Gallaecia. After the invasion of Spain by the barbarians, in the commencement of the 5th century, it shared for a time the fate of the larger part of the peninsula, being successively conquered by the Suevi, Visigoths, and Saracens. Ferdinand I. erected it into a kingdom for one of his sons, who was soon deprived of his throne and estates by Alfonso, king of Castile. Galicia was subsequently often held by the younger sons of the kings of Castile as an appanage, became independent in the course of time, and was finally annexed to his dominions by Ferdinand the Catholic.

GALILEE, the northernmost of the 8 western divisions of Palestine, divided into Upper and Lower Galilee. Upper Galilee was bounded N. by Mt. Lebanon, Coele-Syria, and the regions of Tyre and Sidon, W. by the Mediterranean sea, E. by the Jordan, and S. by Lower Galilee. This division was called Galilee of the nations, or of the gentiles, because of the mixed nature of its population. Lower Galilee was bounded N. by Upper Galilee, W. by the Mediterranean, E. by the lake of Tiberias or Gennesareth, and S. by Samaria. This division contained the tribes of Zebulun and Asher, and its inhabitants spoke a rude, corrupt dialect, different from that of the Jews, and were noted for their turbulent and rebellious spirit. Here Christ resided till he was 30 years of age, and first appeared to his apostles after his resurrection. The chief city of Upper Galilee was Cæsarea Philippi; of Lower Galilee, Tiberias.

GALILEO GALILEI (Galileo, by which he is commonly known, being his Christian name), an Italian philosopher and mathematician, born in Pisa, Feb. 15, 1564, died in Arcetri, Jan. 8, 1642. He came of a noble Florentine family, whose original name was Bonajuti, which they exchanged for that of Galilei about the middle of the 14th century. Vincenzo, the father of the philosopher, was a man of learning and the author of a number of treatises on music. Owing to his large family and his straitened circumstances,



he was unable to give his sons a thorough education, but Galileo acquired, amid various discouragements, a fair knowledge of the classics and the common branches of learning, beside attaining no mean proficiency in music, drawing, and painting. The last named art he seems to have resolved upon cultivating as a profession, but his father had other designs for him, and sent him to Pisa to study medicine, where he was matriculated at the university as a scholar in arts, Nov. 5, 1581, and became a pupil of the celebrated botanist Andreas Cæsalpinus. He still employed his leisure in his favorite branches of the fine arts, and his love of drawing led him to study geometry, in which he took such delight that medicine was neglected, and after many fruitless remonstrances his father was obliged to leave him to the natural bent of his genius. His first discovery was in 1582, when he was led to infer the isochronism of the vibrations of the pendulum by noticing the regular swinging of a lamp in the cathedral of Pisa. The principle does not rigorously hold true when the arcs of oscillation are long and very unequal, but though it was 50 years before the philosopher applied his discovery to clock work, he at once perceived its importance, and caused it to be employed by physicians in counting the pulses of their patients. Some time afterward, having read the treatise of Archimedes on floating bodies, he invented a hydrostatic balance, and wrote a description of it, which introduced him to the friendship of Guido Ubaldi, the mechanist and mathematician. A paper on the centre of gravity, composed at the instance of this distinguished man, was indirectly the means of securing for him at the age of 24 a professorship of mathematics in the university of Pisa. The salary was but 60 crowns, and he had to look for his support partly to private pupils. His native impetuosity at once found vent in attacking the notions of the Aristotelians; but though he fortified his arguments with careful experiments, the sarcasm and violence of his language raised him up a host of enemies, whose attacks pursued him for the rest of his life. He refuted the maxim that the velocity of falling bodies is proportional to their weight, by letting fall unequal weights at the same time from the top of the leaning tower of Pisa, explaining that the trifling difference of time noticed in their respective descents was owing solely to the resistance of the air. The death of his father in 1591 left him the duty of supporting the family, and soon after this the interest of Ubaldi procured him the appointment of professor of mathematics for 6 years in the university of Padua by the republic of Venice. This new position, upon which he entered in Sept. 1592, gave him a salary of 180 florins, beside enabling him to remove from a city where the hostility of the Aristotelians embittered his existence. He constructed for the use of the state several useful machines, and composed treatises on gnomonics, astronomy, mechanics, architecture, and even fortification, which he

delivered in the form of lectures. In 1597 he made a kind of thermometer in which both air and water were employed. It was during this period that he began a friendly correspondence with Kepler, which continued until the death of the latter; and about the same time appeared a treatise on the sphere after the Ptolemaic system, which has been attributed to Galileo on rather insufficient grounds. It was published from a MS. in the library of Somaschi at Venice (Rome, 1656). Probably between the years 1593 and 1597 Galileo became a convert to the Copernican theory of the revolution of the earth about the sun; but it is impossible to fix the date of this important event in his life, for he tells us in a letter to Kepler (1597), that in deference to public opinion he concealed his conviction of the truth of the new doctrines for some years after he had formed it. On the expiration of the term of his professorship, the Venetian senate appointed him for 6 years more, and raised his salary to 320 florins. In 1604, a new star of remarkable brilliancy having appeared in the constellation Serpentarius, he attacked the popular notion that it was a meteor, and proved by the absence of parallax that it was far beyond the limits of our system. In 1606 his appointment at the university was again renewed, with an addition of 200 florins to his compensation. The crowds that came to hear him were now so great that he sometimes had to lecture in the open air, and his reputation was equally high at home and abroad. In 1609 a report reached him at Venice, where he was then visiting, that a Dutchman had constructed an instrument which had the property of making distant objects seem near. Upon his return to Padua the philosopher immediately applied himself to the solution of the mystery, and after trying several combinations of lenses, succeeded in making an instrument which magnified 3 times. It consisted merely of a leaden tube—an organ pipe in fact—with a plano-convex glass at one end and a plano-concave at the other; but so elated was he with his imperfect work, that he carried it to Venice, where it at once became an object of the intensest public curiosity. He presented it to the senate, who thereupon confirmed him in his professorship for life, and raised his salary to 1,000 florins. Galileo soon constructed another telescope which magnified 8 times, and at length a third which had a power of 80. The wonders of the heavens now unfolded to him, which no man had ever seen before, filled him with “incredible delight.” His earliest observations were upon the moon, whose inequalities of surface he was the first to trace. He saw myriads of stars in the milky way, counted 40 in the Pleiades, and at length, on Jan. 13, 1610, after 6 nights’ observation, discovered the revolution of 4 satellites around the planet Jupiter. He did not publish this intelligence until by repeated examination, up to March 22, he had insured himself against the danger of mistake. The account of his discoveries, which he entitled

*Nuncius Siderius*, the "Sidereal Messenger," was received by the astronomers of the old school with insults and incredulity. Some exclaimed against the impiety of scooping out valleys from the fair face of the moon; some attempted to explain away the satellites of Jupiter as mere appearances caused by reflected light. A professor in the university at Padua argued that as there were only 7 metals, 7 days in the week, and 7 apertures in a man's head, so there could be but 7 planets; and when forced to admit the visibility of the satellites through the telescope, he reasoned that, being invisible to the naked eye, they were useless, and consequently did not exist. Several claimed a prior discovery of the "Jovian planets," and the astronomer Zach, as late as 1788, claimed for the Englishman Thomas Harriot the credit of having observed them on Jan. 16, 1610, some time before Galileo's discovery was made known. According to Sir David Brewster, however, Harriot did not perceive them until Oct. 17. The invention of the compound microscope is ascribed to Galileo, not without reason; Viviani, in his life of the philosopher, tells us that the telescope led Galileo to the construction of this instrument, and that he presented one of his microscopes to the king of Poland in 1612. The grand duke of Tuscany rewarded Galileo's services to science by a present of 1,000 florins, and by making him his philosopher and mathematician with a liberal salary and nominal duties. He now removed to Florence. To guard against future attempts to steal his laurels, he published his subsequent discoveries in enigmas, and thus in the course of the same year he announced that Saturn was "triple," an appearance which Huyghens subsequently showed was caused by that planet's rings. Galileo was the first to notice that Venus exhibits phases like those of the moon; and if not the first to descry spots on the sun's disk, he was at least the first to note their peculiarities, and to infer from them the sun's rotation. Some of these observations were made in 1611 at Rome, which he now visited for the first time, where he erected his telescope in the Quirinal garden belonging to Cardinal Bandini. He was received on this occasion with the highest honors, and became a member of the famous Lincean academy founded by Federigo Cesi near the beginning of the 17th century. In 1612 he combated in his work on the laws of floating bodies the common opinion that the tendency of substances to sink or swim in water depends on their shape. With this period in his life the philosopher may be said to have reached the zenith of his prosperity, while at the same time the malice of his enemies began to acquire a dangerous intensity. The Copernican system, which Galileo had long taught in public, afforded a good pretext for attacking him. The sun's revolution round the earth was thought to be a truth of Scripture. Certain Tuscan ecclesiastics began to preach against the wickedness of sending our world spinning through space, and a sarcastic Domini-

can hurled a sermon at Galileo from the text: *Viri Galilei, quid statis adpicientes in cælum?* "Ye men of Galilee, why stand ye looking up into heaven?" In 1618 Galileo had addressed a letter to his pupil Castelli, showing that the language of the Bible should be interpreted according to popular ideas, and that the Ptolemaic system is really as much at variance with it as the Copernican. This was followed by one to Christina, grand duchess dowager of Tuscany, reiterating his views, and supporting them by quotations from the writings of the fathers. A Dominican, Lorini, laid a copy of the Castelli letter before the Roman inquisition in Feb. 1615, but the inquisitors refused to act in the matter, remarking that by confining himself to the system and its demonstration, and letting alone the Scriptures, Galileo would be secure from molestation. His enemies, however, continued their intrigues, and about the end of 1615 he went to Rome, either to obtain a formal sanction of his opinions, or, as some suppose, in obedience to a summons. His case came again before the holy office in Feb. 1616. He was charged with teaching that the sun is the centre of the planetary system, and interpreting Scripture to suit his own theory. The qualifiers of the inquisition pronounced the obnoxious doctrines "formally heretical, because expressly contrary to Holy Scriptures." Galileo's letters to Castelli and the grand duchess, Copernicus's work on the revolution of the heavenly bodies, and Kepler's epitome of the Copernican theory, were placed on the *Index Expurgatorius*, whence they were not removed until the time of Benedict XIV.; and Galileo himself, having failed in deference to the holy office, was obliged to promise never again to teach the motion of the earth and the stability of the sun either by speech or writing. He had a gratifying audience of the pope, however, who assured him of his protection, and in 1617 he returned to Florence. A sickness prevented him from observing the 8 comets which appeared in 1618, but he entered warmly into discussions about them, and is supposed to have had the chief share in a lecture delivered by his friend Guiducci and printed in 1619, in which those erratic bodies are held to be only meteors. This discourse was attacked by the Jesuit Grassi under the pseudonyme of Lotario Sarsi, and defended by Galileo in his *Saggiatore* ("Assayer"), one of the most beautifully written but least sagacious of his works. On the accession of his friend Cardinal Barberini to the pontificate under the title of Urban VIII., he went to Rome to offer his congratulations, arriving in the spring of 1624, and receiving during the 2 months that he remained every mark of esteem and liberality. The pope granted a pension of 100 crowns to him, and one of 60 crowns to his son. Encouraged, perhaps, by the friendly dispositions of the pontiff and the liberal declarations of some of the cardinals relative to the Copernican system, he set about composing a work in which he might sum up all the arguments for his favorite theory. It was

written in the form of dialogues, and accompanied by a preface which was doubtless the most imprudent thing that Galileo ever wrote. In it he treats the inquisition with contempt, charges it by insinuation with ignorance and passion, and covers the decision of 1616 with ridicule. Having ingeniously deceived the censors as to its real character, he managed to procure a license for his book, and it was accordingly published at Florence in 1632 under the title of "Dialogue on the two Principal Systems of the World, the Ptolemaic and Copernican." Such a violation of the injunction could not be overlooked. Galileo was ordered to appear in person at Rome, where he accordingly arrived in Feb. 1633, and took up his quarters with the Tuscan ambassador. His trial was short. The principal ground of complaint was the disobedience of the command of 1616, and the main defence which Galileo seems to have made was that in the years that had elapsed since then he had forgotten that the decree applied not merely to teaching the Copernican doctrine from the Scriptures, but to teaching it in any manner. The sentence was solemnly pronounced, June 22. It set forth the offence of the accused in teaching a condemned proposition, violating his pledge, and obtaining a sanction for his book by improper means, declared him to be vehemently suspected of heresy, required him to abjure his errors and all other heresies against the Catholic church, prohibited his "Dialogue," and condemned him to be imprisoned at the inquisition during pleasure, and to recite once a week for 3 years the 7 penitential psalms. Galileo made his abjuration with all the formality which commonly attended such proceedings. Clad in sack-cloth and kneeling, he swore upon the Gospels never again to teach the earth's motion and the sun's stability; he declared his detestation of the proscribed opinions, and promised to perform the penance laid upon him. Then rising from the ground, he is said to have exclaimed in an under tone: *E pur si muove*—"It does move for all that!" After 4 days' confinement under the eyes of the holy office, Galileo returned to the Tuscan ambassador's, but for the rest of his life he was kept under surveillance. He passed some time in Sienna, in the archbishop's palace, and in December reentered his own house at Arcetri, near Florence, where he remained until the close of his life. A fresh misfortune soon befell him in the death of his favorite daughter Maria, and this stroke so affected his already broken health that he begged permission to visit Florence for medical assistance. It was only after 4 years (1638) that he obtained it, and then under severe restrictions. He seems now to have paid little attention to astronomy, but other branches of natural philosophy engaged his intellect as successfully as ever. In 1638 his book of "Dialogues on Local Motion," completed 2 years before, which he prized above all his other works, was printed at Amsterdam by Louis Elzevir. In 1636 also he discovered the moon's diurnal libration. He next renewed

an attempt which he had made 20 years before to introduce a method of computing longitudes at sea by means of the satellites of Jupiter, but his negotiations on the subject with Holland failed, and indeed his method is now considered impracticable. In 1637 a disease which had impaired his right eye for some years attacked the left also, and in a few months he became totally blind. The severity of the inquisition was somewhat relaxed in his affliction; he was visited by eminent men of his own and foreign countries, among whom were Milton, Gassendi, and Diodati, and in the last years of his life his pupils Viviani and the celebrated Torricelli formed part of his household. Almost complete deafness afterward came upon him, and at last, while preparing for a continuation of his "Dialogues on Motion," he died of fever and palpitation of the heart.—In person Galileo was of middle size, well formed, with fair complexion and penetrating eyes. He was cheerful, frank, and amiable; frugal and abstemious, but fond of gay company and good wine, and profuse in his hospitality. His domestic life was neither virtuous nor happy. His temper was quick, but placable. His general accomplishments made him a favorite in mixed circles; but though he knew so well how to adapt his conversation to his company, he could not bend himself to circumstances when his favorite scientific theories were in question. Too eager for victory to judge well how to secure it, he damaged his own cause far more than the follies and prejudices which he had to combat. Nevertheless, astronomy owes to him, if not its richest inventions, at least some of its most brilliant discoveries. The telescope in the hands of his predecessors was a mere toy; in his hands it acquired such importance that he is often called its inventor. There was scarcely a part of mechanical philosophy which did not employ his genius with the grandest results, and his scientific writings were marked by a clear, elegant, and spirited style, which he owed to a careful study of the literature of his country. He was a great admirer of Ariosto, whose "Orlando Furioso," it is said, he knew by heart, and wrote severe "Considerations on Tasso" (Venice, 1793), to show that author's imitation of his favorite poet.—The following is a list of his principal works which were printed separately: *Operazioni del compasso geometrico e militare* (Venice, 1606); *Difesa contra alle calumnies ed imposture di Balt. Capra nella considerazione astronomica sopra la nuova stella del 1604* (1607); *Nuncius Siderius* (Florence, Venice, and Frankfort, 1610); *Discorso intorno alle cose che stanno in su' l'acqua e che in quella si muovono* (Florence, 1612); *Epistola ad M. Velerum de Maculis Solaribus* (1612); *De Maculis Solaribus et Stellis circa Jovem errantibus accuratior Disquisitio* (Augsburg, 1612); *Istoria e dimostrazioni intorno alle macchie solari e loro accidenti* (Rome, 1613); *Dissertatio de Cometa Anni 1619* (Florence); *Il sagggiatore* (Rome, 1623); *Dialogo sopra i due massimi sistemi*

*del mondo, Telemaco e Copernicano* (Florence, 1632; a Latin translation by Bernegger, entitled *Systema Comicum* &c., Strasbourg, 1635; an English version, "The Systeme of the World, in 4 Dialogues, Inglished from the Original Italian Copy by Thomas Salisbury," London, 1661); *Discorsi e dimostrazioni matematiche attenenti alla meccanica ed i movimenti locali* (Leyden, 1638; an English translation under the title "Mathematical Discourses of Mechanics," by Thomas Weston, London, 1780); *Epistolæ tres de Conciliatione Sacra Scriptura cum Systemate Telluris Mobilis* (printed with Gassendi's *Apologia*, Lyons, 1649). Collections of Galileo's works were published at Bologna by Manolesi (2 vols. 4to., 1656); Florence, by Bottari (8 vols. 4to., 1718); Padua (4 vols. 4to., 1744); Milan (13 vols. 8vo., 1808). A complete edition was begun at Florence in 1842, and 12 vols. royal 8vo. had appeared in 1854.—For lives of Galileo see Viviani, *Vita del Galilei*, in the *Fatti consolari dell' accademia Fiorentina*; Frisi, *Elogio del Galileo* (Leghorn, 1775); Brenna, in Fabrina's *Vita Italorum*; Nelli, *Vita e commercio letterario di Gal. Galilei* (2 vols. 4to., Lausanne, 1793); Libri, *Histoire de la vie et des œuvres de Galil. Galilei* (Paris, 1841); Biot, in Michaud's *Biographie universelle*; Drinkwater, "Life of Galileo" in the "Library of Useful Knowledge;" Sir David Brewster, in Lardner's "Cabinet Cyclopaedia," reprinted with lives of Tycho Brahe and Kepler under the title "Martyrs of Science" (London, 1841).

GALLOT, the smallest kind of galley, without guns, used chiefly in the Mediterranean. It is designed only for chase, and has both sails and oars. The name is also given to a peculiar flat-bottomed vessel, strongly built, and used as a bomb ship against forts and batteries. A kind of merchant vessel, strong and clumsy, used by the Dutch, Swedes, and other northern nations, is also termed a galiot.

GALL, FRANZ JOSEPH, the founder of phrenology, born in Tiefenbronn, near Pforzheim, in Würtemberg, March 9, 1758, died at Montrouge, near Paris, Aug. 22, 1828. His father, of Italian origin, was a merchant, and he was first prompted to study by his uncle, a neighboring curate. After literary studies at Baden and Bruchsal, he devoted himself especially to natural history and anatomy at Strasbourg under Hermann, and passed thence in 1785 to the medical school of Vienna, where he attended the lectures of Van Swieten and Stoll, and received the degree of doctor in 1785. He gradually obtained success in the practice of his profession, with leisure, however, for gardening and study. While a boy he had been struck with the differences of character and talents displayed by his companions, and after some time he noticed that those students who excelled in committing pieces to memory all had large eyes. By degrees he suspected that the external peculiarities of the head corresponded with differences in the intellectual endowments and moral qualities, and disputed the theories of Aristotle, Van Helmont, Des-

cartes, and Drelincourt, who fixed the soul respectively in the heart, the stomach, the pineal gland, and the cerebellum. He began diligently to examine the heads of those who had exhibited any striking mental peculiarity; the lunatic asylum gave him opportunities to make observations on monomaniacs; he visited prisons, courts of justice, and seats of learning; and whenever he heard of a man remarkable for either good or evil, he made his head a study. He extended his observations to animals, and finally sought confirmation in the anatomy of the brain, of which he was the first to perceive the true structure. After 20 years he conceived that he had determined the intellectual dispositions corresponding to about 20 organs, that he had found the seats of these original faculties in the brain, and that they formed prominences or protuberances on the skull proportionate to their degree of activity. In 1791 he published the first volume of a general medical work, and in 1796 began to lecture on his peculiar theory in Vienna, where the novelty of the views made a great sensation. The first written account of them appeared in a letter published in the *Deutscher Mercur* of Wieland in 1798. In 1800 he gained his best disciple, Spurzheim, who gave great aid in the development and popular exposition of the doctrine. Dr. Gall continued his lectures till in 1802 they were interdicted by the Austrian government as dangerous to religion. He quitted Vienna in 1805, and in company with Spurzheim, who was his associate till 1813, travelled in central and northern Europe, lecturing in the principal, especially the university towns, and arrived in Paris in 1807. He established himself as a medical practitioner, and immediately delivered a course of lectures before a numerous audience. His principles, however, met with much opposition; ridicule was not spared, and Napoleon opposed him and classed him with Cagliostro and Mesmer. He presented to the institute in 1808 his *Recherches sur le système nerveux en général, et sur celui du cerveau en particulier*, and published it in the following year. In 1821 his name was proposed for the academy of sciences, but he obtained only the vote of the friend who had counselled the step, Geoffroy St. Hilaire. In 1823 he made a short visit to London, where the receipts from his lectures were less than the expenses. The most elaborate of his works is the *Anatomie et physiologie du système nerveux* (4 vols., Paris, 1810-'19), a second edition of which was published in 6 vols., each bearing a different title. An English translation of the whole work by Winslow J. Lewis, Jr., M.D., was published in Boston (6 vols., 1835).

GALL BLADDER, the pear-shaped membranous reservoir, situated in a slight depression on the lower surface of the right lobe of the liver, which contains the bile during the intervals of digestion. The larger extremity is directed forward and to the right side; the body of the organ is adherent above to the substance of the liver by dense areolar tissue, free below,

covered by the peritoneum, and resting upon the pylorus, duodenum, and right arch of the colon; the neck is narrow and continuous with the cystic duct, about an inch and a half long, which unites with the hepatic duct from the liver, of about the same length, to form the common bile duct (*ductus communis choledocus* of anatomists). It is composed of an external serous coat, a middle areolar contractile tissue, and an internal mucous membrane; the arteries are derived from the hepatic branch of the celiac axis, the nerves from the hepatic plexus, and the veins empty their contents into the vena portæ. The hepatic duct is formed by the junction of the 2 principal branches (one from each lobe), the result of the union of the numerous ramifications from the interior of the liver; during digestion the bile flows without obstruction into the duodenum, but in the intervals of this process the intestinal orifice of the common duct is closed, and the bile flows by the cystic duct backward into the gall bladder, whose office is essentially that of a reservoir, enabling the bile to be constantly secreted, and insuring a supply for the service of digestion. The common duct is formed by the union of the hepatic and cystic ducts, and is about  $3\frac{1}{4}$  inches long, opening obliquely into the duodenum near its last curve, by an orifice in the middle of a slight elevation. The stimulus of the food opens the intestinal orifice, and bile is discharged both from the liver and the gall bladder during digestion, its passage being effected by the contraction of the walls of the gall bladder and the ducts. Ordinarily containing a few ounces, the gall bladder may be so distended as to contain several pints, and it may be so atrophied as to be little larger than a pea; these cases, and the fact of the absence of the reservoir in many animals, show that its physiological importance is not very great. It is subject to ossification, cancer, acute and chronic inflammation from the irritation of gall stones or extension of diseases from the intestine; its diseases may end in ulceration, and obliteration of the ducts. From its small size and protected situation it is rarely directly wounded, though it is sometimes ruptured by great external violence. The gall bladder is absent in invertebrates, in which the bile ducts open directly into the digestive cavity; it is present in most fishes, all reptiles, and most birds. There seems to be no general law regulating its presence or absence in mammalia; it is wanting in many rodents (as the mice), in the elephant, rhinoceros, tapir, camel, peccary, horse, stag, and dolphin; it is present in the monkeys, bats, carnivora, almost all edentates, and in many ruminants (as the ox, sheep, goat, and antelope). In the cats there are sometimes 2 gall bladders. With the exception of the dolphins, it seems that all mammals in which it is absent are vegetable feeders.

GALL INSECTS, various genera belonging to the orders *hymenoptera* and *diptera*, which deposit their eggs in the tissue of plants, producing excrescences or galls upon them, in the

interior of which their young are brought to maturity. The insects which produce the nut galls of commerce, used in dyeing and the manufacture of ink, are *hymenoptera* of the genus *cynips* (Linn.) or *diplolepis* (Geoffr.); they are small, with 4 wings, the anterior long and with a single or few nervures, the posterior small and veinless; the head is small, the antennæ short and slender, the thorax thick and elevated, the abdomen sharp-edged above and below, and attached to the thorax by a very slender stem; the females are provided with a long slender ovipositor, attached near the origin of the abdomen, whose curvature it follows, and contained between 2 sheath-like pieces which serve to conduct the eggs into the hole made by the piercer; they constitute the family *cynipida*. The wounds made in the plant are followed by swellings which increase rapidly, becoming spongy within; these galls partake of the chemical character of the juices, and on the oaks are highly astringent; the eggs dropped into the punctures grow by the absorption of the surrounding sap, and the grubs when hatched find themselves surrounded by an ample supply of food, and finally gnaw out of the gall when they arrive at maturity; the grubs resemble maggots, of a whitish color, and are without proper legs. Each species of gall fly generally confines itself to one sort of plant, and always produces galls of the same kind; hence there are almost as many kinds of galls as there are species of gall flies. Some of these excrescences are irregular and uneven, others round and smooth; some hang by small stems, others are flat, applied either to the wood or leaves; soft at first, they become hard and woody. The insect which produces the nut gall used in medicine and the arts is the *C. galla tinctoria* (Geoffr.), which pierces the dyer's oak, a native of the middle latitudes of Asia; the body is fawn-colored, the upper part of the abdomen shining brown, and the antennæ dark; a single insect usually inhabits each gall. The *C. confluentus* (Harris) of America is nearly  $\frac{1}{2}$  of an inch long, with an expanse of wings of  $\frac{3}{4}$  of an inch; the head and thorax are black, roughened by hairs, the hind body smooth and of a shining pitch color, the legs brownish red, and the fore wings with a brown spot. It pierces the leaves of the red oak, and the swellings (or oak apples) measure  $1\frac{1}{2}$  to 2 inches in diameter; green and soft at first, they become hard-shelled and drab-colored, inclosing a quantity of brown spongy matter, and a central woody kernel as large as a pea; the grub becomes a chrysalis in the autumn, when the oak apple falls to the ground, and it changes to a fly in the spring, though it sometimes comes out a perfect insect in October. Most species of oak are susceptible to this kind of action; our white oak has its small twigs pierced by the *C. oeneratus* (Harris), a small species only  $\frac{2}{3}$  of an inch long, which produces clusters of galls about the size of bullets, greenish on one side and red on the other. The *C. nubilipennis* (Harris), with a smoky tip to the wings, causes

galls of the size and color of grapes. There are many other gall-producing insects, and the excrescences found on oaks in the United States are different from those of Europe. Rose bushes are attacked by the *C. bicolor*, *dichlocerca*, and *semipiceus*. All such galls on plants of any value should be cut off and burned; many of these gall insects are destroyed in the grub state by parasitic *hymenoptera* of the family *chalcididae*.—There are several dipterous insects which produce unnatural enlargements of the stems of plants, especially in the genus *cecidomyia*, or gall gnats. The willow gall fly (*C. salicis*, Fitch) is about  $\frac{1}{2}$  of an inch long, of a deep black color above, paler and downy beneath; its galls are found on the ends of the slender twigs of the American basket willow (*salix rigida*) and other dwarf species, of an oval shape, about  $\frac{1}{2}$  of an inch long and  $\frac{1}{4}$  of an inch thick, terminated by a brittle conical beak; when cut open in winter or spring, in a longitudinal silk-lined channel will be found an orange-colored maggot  $\frac{1}{2}$  of an inch long; this becomes a pupa in the course of the spring, of a blood-red color, without any shedding of the larval skin. The *C. robinia* (Hald.) is a smaller species, thickening the edges of the leaves of the locust tree. Other *diptera* of the family *ortulididae* deposit their eggs in the stems, buds, and leaves of plants, producing excrescences or galls in which the young reside; swellings thus caused, as large as walnuts, are sometimes seen on the stalks of asters or starworts; it is the *tephritis asteris* (Harris), about  $\frac{1}{2}$  of an inch long, of a light yellowish brown color, with paler legs.

#### GALL NUTS. See GALLS.

GALL STONES, or BILIARY CALCULI, the concretions formed from the elements of the bile, situated most frequently in the gall bladder, but found also in the liver and its ducts, whence they pass into the intestines and are often discharged from the body. The most common form of these stones consists principally of cholesterine, a crystallizable fatty ingredient of healthy bile, whose chemical constitution is  $C_{27}H_{45}O_2 + 2Aq$ ; according to Berzelius, it does not exceed in quantity one part in 10,000 in the bile; taurocholic acid (choleic acid of Strecker) possesses a certain solvent power over it, and holds it in solution; owing, however, to its extreme insolubility, when once deposited it cannot be reabsorbed, and hence often accumulates in the gall bladder. Cholesterine gall stones have a crystalline structure, fuse at a heat of  $298^{\circ}F.$ , and have sometimes less specific gravity than water; they vary considerably in shape and appearance, in some cases nearly semi-transparent and crystallized throughout, in others strongly tinged with the coloring matters of the bile, or formed of concentric layers on a nucleus of phosphate of lime. Their forms are generally rounded, and worn by attrition one against the other; their size varies from a fine sand to the volume of a hen's egg, the usual dimensions being about  $\frac{1}{2}$  to  $\frac{1}{4}$

inch in diameter; Meckel has described one  $5\frac{1}{2}$  inches long and  $4\frac{1}{2}$  in circumference, weighing  $1\frac{1}{2}$  oz. They are rarely single, and are often found several hundreds together; the color is light in proportion to the amount of cholesterine in their composition, and dark in proportion to the amount of the green coloring matter of the bile. They are most common in old persons, and especially in the female sex; it is very rare to examine the hepatic system of aged females without finding more or less gall stones; under the age of 12 years they are very uncommon. The formation of these concretions, which vary much in hardness as well as in size and number, has been attributed to irritation of the gall bladder and its ducts, and to the retention of the bile from inertia of its walls, the position and tortuous character of the ducts, and the consequent deposition of the elements of the bile; but as cholesterine, the principal ingredient of these stones, is a normal constituent of the blood, and is present in the brain and in various natural and diseased exudations, it is more likely dependent on some ill-understood but ever-acting vital chemical changes, as yet beyond the ken of organic chemistry.—The presence of gall stones is not necessarily indicated by any special or painful symptoms, and their existence in considerable numbers is not incompatible with good health and long life; when of large size, or obstructing the flow of bile in any direction, there may be pain, tenderness, swelling, vomiting, jaundice, and constipation. When a stone of large size or irregular shape is impacted in any of the ducts, the pain may be intense, causing what is called hepatic colic, accompanied with fever and inflammatory symptoms; this agony continues until the patient is stupefied by narcotics, or the stone has passed into the alimentary canal, whence it is removed by the stools, or in some cases by vomiting. A stone may become enlarged in the intestines, and cause a fatal obstruction; it is said that Loyola, the founder of the Jesuits, came to his death by the passage of a stone from the gall bladder by perforation into the vena portæ. The pathognomonic signs of these stones are the passage of one or more from the intestine, and the sound of friction or crepitation when the gall bladder is suddenly compressed by the hand; if to these be added frequent accessions of pain and heaviness in the right hypochondrium, with jaundice, the diagnosis is greatly assisted. If inflammation arises in the organ, adhesions may take place, and the stones may safely pass into the intestines, or externally through the abdominal walls. The indications of treatment are to relieve pain and spasmodic action of the ducts, to cause the solution or evacuation of the stones, and to arrest any accompanying inflammation which may arise. The first indication was formerly met by the free exhibition of narcotics, especially opium, and by the external application of fomentations and refrigerants; of late years, the inhalation of sulphuric ether has been found to answer the purpose in a complete, rapid, and

safe manner. To fulfil the second indication, gross animal or salted food, acrid vegetables, and spirituous liquors are forbidden, and an opposite diet with ferruginous mineral waters recommended; mixtures of sulphuric ether and spirits of turpentine were believed to have the property of dissolving biliary concretions; emetics were given to cause their expulsion by the contractions of the diaphragm and the consequent concussions of the organs, and powerful cathartics to insure the removal of any that might be lodged in the intestines. Any complicating inflammation is treated on general principles. It has sometimes been found necessary to procure adhesion of the gall bladder to the abdominal walls by caustic potash, and then to remove the stone by the knife or by caustic; persons have lived for years with fistulæ communicating with the gall bladder, without any apparent suffering in health. Alkaline solutions have without sufficient reason been regarded as the most likely to dissolve gall stones.

GALLAGHER, WILLIAM D., an American journalist and poet, born in Philadelphia in 1808. He removed in 1816 to Cincinnati, where in 1825 he entered the printing office of a newspaper. He wrote occasionally for the press, and became editor successively of the "Backwoodsman," at Xenia, O. (1830), the "Cincinnati Mirror" (1831), the "Western Literary Journal and Monthly Review" (1836), the "Hesperian, a Monthly Miscellany of General Literature" (1838), and in 1839 associate editor of the "Cincinnati Gazette," in which position he remained till 1850. He published 8 small volumes of poetry (1835-'7), each entitled "Erato," the principal pieces in which are the "Penitent," the "Conqueror," and "Cadwallen." In 1841 he published a volume of "Selections from the Poetical Literature of the West," and in 1846 a select edition of his poems. When Thomas Corwin became secretary of the treasury in 1850, Mr. Gallagher accompanied him to Washington as his confidential clerk. In 1853 he removed to Louisville, Ky., and was for a time one of the editors of the "Daily Courier," but has since resided on a farm near the city.

GALLAIT, Louis, a Belgian historical painter, born in Tournay in 1810, spent several years in studying his art in Paris. Among his pictures most celebrated and popular in Belgium is one illustrating the last honors paid to Egmont and Horn after their execution, which has been purchased by his native city, and one representing the last moments of Egmont (1853). His "Abdication of Charles V." is in the court of casation of Brussels, and his "Montaigne visiting Tasso" is in the possession of King Leopold. His "Temptation of St. Anthony" has been presented by Leopold to Prince Albert. Most of his pictures have been exhibited and much admired in Paris; some of them are at Versailles and in the Luxembourg. He is now (1859) completing his great tableau of "Dalia."

GALLAND, ANTOINE, a French antiquary

and linguist, born near Montdidier, in Picardy, April 4, 1648, died in Paris, Feb. 17, 1715. In 1670 he became attached to the French embassy at Constantinople, visited Jerusalem, and copied there a great number of inscriptions, several of which Montfaucon published in his *Palaographia Graeca*. Returning to France in 1675, he subsequently made two voyages to the Levant to collect medals, coins, &c. He was afterward appointed antiquary to the king. In 1709 he was appointed professor of Arabic in the royal college of France. His works are very numerous, but the most popular of them all perhaps is his translation into French of the "Tales of the Thousand and One Nights" (12 vols., Paris, 1704-'17), the famous "Arabian Nights' Entertainments," which he was the first to introduce to the knowledge of Europe. For some time they were thought to be inventions of his own.

GALLAS, a race of E. Africa, comprising a number of tribes inhabiting the imperfectly explored region to the west, south, and east of Abyssinia, bordering on the country of the Danakil, Harrar, the Somaui, and the countries of Zendero, Guragne, Caffa, and Enarea. They are also found in various parts of Abyssinia, where they have made extensive conquests. They seem to hold an intermediate place between the Arabian and negro races. Their color is dark brown, their hair strong and frizzled, though not exactly woolly, their eyes are small, features thick and flattened, faces round, and persons generally large and well formed. They are mostly pastoral in their mode of life, although some of the tribes bordering on Abyssinia are tillers of the soil. Mohammedanism has made converts among them, but the majority of the tribes adhere to paganism. Their religion is said to resemble that of the Caffres. They worship a supreme incomprehensible being whom they call Wak, and who manifests his will by dreams and omens, of which priests are the interpreters. These priests, who, according to Major Harris, are divided into 2 orders, sacrificers and sorcerers, carry with them a whip and bells, and the intestines of goats wound about their necks; these last implements of priestcraft are their favorite means of divination. The Gallas pray occasionally to their god, believe in a future state of reward or punishment, and the males of all the pagan tribes, however differing in other respects, make pilgrimages to a sacred tree on the banks of the Hawash, south of Shoa. A remarkable resemblance of the Galla religion in some points to Christianity was pointed out by Dr. Beke in the "Friend of the African" (vol. i., 1844), and seems to justify the belief that at some remote period they had a knowledge of the Christian faith. Their language bears affinity to the languages of the Somaui and Danakil. The word Galla in their tongue signifies invader, and the name by which they designate all their tribes in common is Oroma (*orma*, men). The tribes are independent of each other, some observing a patriarchal form of government, and

some being ruled by females. The origin of this people has been much disputed. Some supposed them to be descendants of whites belonging to the Hebrew nation, and derive their name from the Hebrew *halab*, milk—an allusion to their original color. Others believed them to be Meccan Arabs who settled on the W. coast of the Red sea at a very early period. Dr. Beke places their cradle far S. of Abyssinia, and probably in the mountainous country near the sources of the Nile. It seems certain that they are of negro race, and that their original territory is some distance S. of that which they now occupy. The Abyssinians trace the origin of the Gallas to an Abyssinian princess who was given in marriage to a slave from the country S. of Gurgue, and had 7 sons who became mighty robbers and founders of tribes. They invaded and settled in Abyssinia as early as 1537, and have continued their conquests and appropriations until they are now in possession of the fairest portions of that country.

GALLATIN. I. A. N. co. of Ky., separated from Indiana by the Ohio river; area estimated at 150 sq. m.; pop. in 1850, 5,137, of whom 704 were slaves. It is diversified by well wooded hills, and abounds in blue or Trenton limestone. The productions in 1850 were 402,150 bushels of Indian corn, 27,388 of wheat, and 198,095 lbs. of tobacco. There were 6 churches, 1 newspaper office, and 380 pupils attending public schools. Value of real estate in 1855, \$1,000,623. Capital, Warsaw. II. A. S. E. co. of Ill., drained by Saline creek, separated on the E. from Kentucky by the Ohio river, and from Indiana by the Wabash; area, 310 sq. m.; pop. in 1855, 6,728; in 1858, about 8,500. It consists mostly of forest land, has a fertile soil, and contains valuable salt springs. The staples are horses, cattle, swine, lumber, tobacco, and salt. The agricultural products in 1850 were 436,125 bushels of Indian corn, 25,987 of oats, 200 lbs. of tobacco, and 47,622 of butter. There were 7 churches, 1 newspaper office, and 555 pupils attending public schools. A railroad has been projected from Vincennes to Paducah, which will pass through the county. Capital, Equality. Organized in 1812.

GALLATIN, ALBERT, an American statesman, born in Geneva, Switzerland, Jan. 29, 1761, died in Astoria, Long Island, N. Y., Aug. 12, 1849. His original name was Abraham Albert Alphonse de Gallatin. His father, Jean de Gallatin, was a councillor of state. His parents, who were both of ancient and distinguished noble families, numbering among their connections the celebrated Necker and his daughter Madame de Staël, died while he was an infant. To the care of a female relative of his mother he owed an excellent education, which was completed at the university of Geneva, where he was graduated in 1779. At the university he gained the friendship of the young landgrave of Hesse-Cassel, who offered him a commission as lieutenant-colonel, which he declined, his republican principles and his sympa-

thy with the Americans in their revolutionary struggle impelling him to prefer, like Lafayette, to cross the Atlantic and volunteer his services to the cause of liberty. Early in 1780 he embarked for Boston in a vessel which by stress of weather was compelled to put into one of the harbors of Cape Ann. At a tavern on the cape near where he landed he found some Swiss from Geneva who knew his family. They were on their way to Machias, in Maine, where they intended to settle. He was easily persuaded to accompany them thither. On his arrival at Machias he found Capt. John Allen, the commandant of the fort, employed in raising volunteers for the defence of Passamaquoddy. Gallatin offered his services, and marched with the volunteers to the frontier, assisting them to drag a heavy cannon over swamps and muddy roads. He was soon appointed commander of the fort of Passamaquoddy, which was garrisoned by a small force of volunteers, militia, and Indians. The troops being in great want of supplies, he advanced \$600 out of his own pocket, for which he received from Allen an order on the treasury of the United States. In Oct. 1780, he went to Boston, and on presenting his order found that there was no money in the treasury. His necessities compelled him to sell the draft for about one third of its nominal value. Soon after reaching Boston, with a fondness for geographical investigations that distinguished him through life, he made a series of excursions in different directions, in one of which he ascended Wachusett mountain, the highest in Massachusetts east of the Connecticut. In 1788 he was for a short time teacher of French at Harvard college, and in the following year, having received from Europe his patrimonial property, he went to Virginia and purchased a large tract of land in the western part of that state for the purpose of forming a settlement, from which he was deterred by the hostilities with the Indians. While surveying these lands he first met with Washington, who also owned large estates in that region. Washington was seated in a land agent's log cabin, surrounded by a number of squatters and hunters, whom he was examining with a view to ascertain the best route for a road across the Alleghanies. Gallatin mingled with the throng and stood looking on for some time, while Washington put his questions with slowness and deliberation, and carefully noted down the answers. It was soon evident to the quick-minded Swiss that there was but one practicable pass; and after the testimony had abundantly settled the point, he grew impatient at Washington's slowness in coming to a conclusion, and suddenly interrupting the general's cross examination, cried out: "Oh, it's plain enough that [naming the place] is the most practicable." The by-standers stared with astonishment at the presumptuous youngster, and Washington, laying down his pen, looked at him sternly for a moment in evident displeasure, but did not speak. Presently he resumed his pen, put a



few more questions to the man he was examining, then suddenly threw down his pen, and, turning to Gallatin, said: "You are right, sir." "It was so on all occasions," said Gallatin to Mr. John Russell Bartlett, to whom, more than 60 years afterward, he related the anecdote; "Gen. Washington was slow in forming an opinion, and never decided until he knew he was right." After Gallatin went out, Washington inquired about him, and, learning his history, made his acquaintance, and urged him to become his land agent. Gallatin, however, declined the situation, and in 1786, by the advice of Patrick Henry, he purchased some land on the banks of the Monongahela in Fayette co., Penn., settled there, became naturalized, and devoted himself to agriculture. In 1789 he was elected a member of the convention to revise the constitution of the state, and in the two succeeding years was a member of the legislature, to which he was chosen as the candidate of the republican or democratic party. In the latter body he proposed measures to resuscitate the credit of Pennsylvania which gave strong indications of the financial abilities which he afterward displayed so conspicuously in the administration of the federal treasury. In 1793 the legislature elected him U. S. senator. He took his seat, but his right to it was contested, and at the end of two months it was decided by a strict party vote of 14 federalists to 12 democrats that he was ineligible. The constitution requires that a senator should have been 9 years a citizen. It was contended by the democrats that the 9 years' citizenship began with Gallatin's arrival in Massachusetts in 1780; but the federalists maintained that it did not begin until he took the oath of allegiance in 1785. The legislature of Pennsylvania acquiesced in the decision, and chose James Ross in Gallatin's place. In 1794, during the recess of congress, the disturbance known as the "whiskey insurrection" broke out in western Pennsylvania; its object was resistance to the excise laws. Gallatin took part in the peaceful political opposition to the excise, and afterward, on Aug. 1, 1794, acted as secretary of a great meeting of armed men collected by the leaders of the insurrection. He also acted as secretary of a delegate convention of the same party assembled Aug. 14 at Parkinson's Ferry, and subsequently was one of a committee appointed by the insurgents to propose terms to the government. His object, however, in mingling with these transactions, was to exert his influence to suppress the insurrection, and to bring about a peaceful accommodation between the government and the people. This was finally effected, in great part by Gallatin's tact, courage, and firmness, at considerable personal risk to himself. So highly were his services in the cause of order estimated in his own neighborhood, that the people of a district adjoining that in which he resided, comprising Washington and Alleghany counties, nominated him without his knowledge for representative to congress, on the express ground of his successful management of

the excise difficulties, and elected him 8 days after his nomination over the regular candidates of both political parties. For 3 terms in succession he was reelected from the same district. He entered congress in Dec. 1795, and soon took a high position in debate and legislation, and was recognized as the leader of the republican or democratic party, though Madison and other able and experienced men of the same party were in the house with him. By a speech delivered April 26, 1796, in opposition to the British treaty, during the great debate on that question, he established beyond all dispute his reputation as a dexterous and unflinching politician, though the tone he adopted greatly exasperated the federalists, who could not patiently listen to denunciation of Washington and Jay as having pusillanimously surrendered the honor of their country, coming as it did, says Hildreth, "from the mouth of one whose evident youth and foreign accent might alone serve to betray him as an adventurer, whose arrival in the country could hardly have been long anterior to the termination of the revolutionary struggle." A leading federalist, Mr. Tracy of Connecticut, replied to Gallatin, and in the course of his speech remarked that "he could not feel thankful to any gentleman for coming all the way from Geneva to accuse Americans of pusillanimity." Two days later, Fisher Ames made his great and decisive speech in favor of the treaty. In the course of the debate Gallatin made a speech on the resolution calling on the president for Jay's correspondence, which Jefferson in a letter to Madison declared was "worthy of being printed at the end of the 'Federalist,' as the only rational commentary on the part of the constitution to which it relates." In every important debate that took place while he was in congress Gallatin participated with vigor and effect, though his favorite topics were such as related to financial questions. It was on his motion that the committee of ways and means was first organized as a standing committee of the house in 1795. He explained his financial views in two pamphlets, "A Sketch of Finances" (1796), and "Views of Public Debt," &c. (1800). Beside his speeches on the British treaty, he made important speeches on "Foreign Intercourse," March 1, 1798; on the "Alien Law," March 1, 1799; and on the "Navy Establishment," Feb. 9 and 11, 1799. On May 15, 1801, he was appointed by President Jefferson secretary of the treasury, which office he held through 3 presidential terms, under Jefferson and Madison, till 1813. He was eminently successful in his management of the treasury department, and soon attained a distinguished reputation as one of the first financiers of the age. His annual reports exhibit great ability, and had the highest influence upon the general legislation of the republic. He opposed the increase of the national debt, and prepared the way for its gradual extinction. He systematized the mode of disposing of the public lands, and was a zealous advocate of internal improvements, and particularly of the national

road and of the coast survey. He also exercised great influence on the other departments of the government, and on the politics of the country. In 1809 President Madison offered him the state department, which he declined, preferring to remain at the head of the treasury. He was opposed to going to war with Great Britain in 1812, and as a member of the cabinet exerted himself strenuously to restore amicable relations with the British government. An offer having been made by the Russian government to mediate between the United States and Great Britain, President Madison, March 8, 1813, nominated as ministers to negotiate, Gallatin, James A. Bayard of the senate, and John Quincy Adams, at that time American minister at St. Petersburg. Gallatin and Bayard in May sailed for St. Petersburg in a private ship, with a cartel from the British admiral, granted at the request of the Russian ambassador at Washington. The appointment of these commissioners had been made during the recess of congress. In a few weeks the senate came together in a called session, when great opposition was made to Gallatin's confirmation, on the ground that a diplomatic appointment was inconsistent with the headship of a department, it appearing that Gallatin still remained secretary of the treasury, an arrangement having been made by which, during his absence, the duties of his office were discharged by the secretary of the navy, under an act of 1792 which allowed such temporary substitutions. The senate, after discussion, rejected Gallatin as commissioner by a vote of 18 to 17. The attempt at Russian mediation resulted in nothing, but in Jan. 1814, an offer was received from the British government proposing a direct negotiation for peace at London or Gottenburg. Selecting Gottenburg as the place, President Madison nominated as commissioners John Quincy Adams, Henry Clay, Jonathan Russell, Bayard, and Gallatin. Gallatin was still abroad, and to obviate the objection of the senate on account of his holding the office of secretary of the treasury, he resigned that post definitively, and a successor was appointed. It was finally decided that the negotiations should be conducted at Ghent. In the discussions which resulted in the treaty of peace, Dec. 24, 1814, and in the commercial convention with Great Britain a short time afterward, Gallatin had a prominent and honorable share. In 1815 he was appointed minister to France, where he remained until 1823. During this period he was twice deputed on special missions of importance, to the Netherlands in 1817 and to England in 1818. While in this office he rendered some essential service to Mr. Alexander Baring in the negotiation of a loan for the French government. Mr. Baring in return pressed him to take a part of the loan, offering him such advantages in it that without advancing any funds he could have realized a fortune. "I thank you," was Gallatin's reply; "I will not accept your obliging offer, because a man who has had the direction of the finances of his country as long as I have

should not die rich." On his return from France he refused a seat in the cabinet, and declined to be a candidate for vice-president, to which he was nominated by the democratic party. In 1826 he was appointed by President Adams envoy extraordinary to Great Britain. After negotiating several important commercial conventions, he returned to the United States in Dec. 1827, and took up his residence in the city of New York. Soon after his return he prepared the argument in behalf of the United States to be laid before the king of the Netherlands as an umpire on the Maine boundary question. In 1830 he was chosen president of the council of the university of New York. In 1831 he published "Considerations on the Currency and Banking System of the United States," in which he advocated the advantages of a regulated bank of the United States. He was a member of the free trade convention at Philadelphia in 1831, and prepared for that body the memorial which was submitted to congress. From 1831 to 1839 he was president of the national bank in the city of New York, and on his resigning the office was succeeded by his son James Gallatin. The remainder of his life was devoted to literature, and especially to historical and ethnological researches. He was elected president of the New York historical society in 1843, and held the office till his death. In the previous year he had been one of the chief founders, and was chosen first president of the ethnological society. During the controversy with Great Britain on the north-eastern boundary he published an able pamphlet on the subject, which displayed great research. Again, in 1846, during the Oregon difficulties, he published letters on the "Oregon Question," distinguished by impartiality, moderation, and power of reasoning. He was strongly opposed to war, and two years later, during the war with Mexico, he wrote a pamphlet of which 150,000 copies were printed, and which had a marked influence on public opinion. At an early period Mr. Gallatin turned his attention to the ethnological and philological characteristics of the American Indians. His first essay on this topic was written in 1823 at the request of Humboldt. He afterward published "Synopsis of the Indian Tribes within the United States, east of the Rocky Mountains, and in the British and Russian Possessions in North America," forming vol. ii. of the *Archæologia Americana* (American antiquarian society, Worcester, 1836); and the subject was one of the last that occupied his pen, in a work on the "Semi-Civilized Nations of Mexico, Yucatan, and Central America," with "Conjectures on the Origin of Semi-Civilization in America" (American ethnological society, New York, 1845). A French biographer of Gallatin, M. Feillet, remarks that his career was one of the happiest and most successful that ever fell to the lot of man. From the position of a friendless adventurer in a strange land he speedily raised himself by force of talent and energy to fame and power, filled with distinction the highest

offices, and after half a century of public service passed an honored and serene old age in study and in the cultivation of literature and science. "Mr. Gallatin," said Judge Story in a letter to a friend, "preserved a purity of character that is as valuable in a politician as it is rare. He is a most industrious and indefatigable man, and, by the consent of all parties, of accomplished genius and great acquirements. Let me say he is a truly great statesman. I rank him side by side with Alexander Hamilton."

GALLAUDET, THOMAS HOPKINS, LL.D., founder of the first institution in America for the instruction of the deaf and dumb, born in Philadelphia, Dec. 10, 1787, died in Hartford, Conn., Sept. 9, 1851. He was of Huguenot descent, early removed with his parents to Hartford, and was graduated at Yale college in 1805. He was successively a student of law, tutor in the college, and clerk in a counting-room, till in 1811 he entered the theological seminary at Andover, to prepare for the ministry. He was licensed to preach in 1814, but immediately became interested in the instruction of deaf mutes, and was appointed to superintend the establishment of an institution at Hartford for that purpose. To further this project, and to learn the best method of instruction, he went to Europe in 1815, visited London, Edinburgh, and Paris, and returned in the following year with Laurent Clerc, a highly educated deaf mute, who had been a favorite pupil of the abbé Sicard, and a teacher in the Paris institution. Meantime the asylum for the deaf and dumb had been chartered at Hartford, a building was in process of erection, and it went into operation in 1817 with a class of 7 pupils. Dr. Gallaudet retained his connection with it as principal till his resignation on account of impaired health in 1830, after which he continued to be one of the directors. More than 1,000 persons were educated at the asylum during his lifetime, which became also the parent of similar institutions in other parts of the country. After a short respite from his labors, he engaged again in philanthropic efforts, prepared various works to aid the education of the young, and in 1838 became chaplain of the Connecticut retreat for the insane, at Hartford, which office he retained till his death. He published a volume of "Discourses" (London, 1818), preached to an English congregation in Paris, a series of "Bible Stories for the Young," the "Child's Book of the Soul" (8d ed. 1850), the "Youth's Book of Natural Theology," and other similar works, and edited 6 vols. of the "Annals of the Deaf and Dumb" (Hartford). A discourse on his life, character, and services, by Henry Barnard, was published at Hartford in 1852. His biography, by Heman Humphrey, D.D., was published in New York in 1857.

GALLE, I. G., a German astronomer, born in Pabsthausen, Prussian Saxony, in 1812, was for many years director of the observatory in Berlin, and has officiated since 1853 in the same capacity and as professor of astronomy in Breslau. He discovered a comet in the constellation

Virgo (Dec. 2, 1839), in the Dragon (Jan. 25, 1840), and in the Swan (March 6, 1840), and made the first observation of the planet Neptune (Sept. 25, 1846) predicted by Leverrier. He has found from recent estimates, and by comparison with neighboring stars, that the 3d and brightest of Jupiter's satellites is probably of the 5th or 6th magnitude, while the others, which are of various degrees of brightness, are all of the 6th or 7th magnitude; and he supplied his friend Humboldt with a lucid exposition of the photometric arrangement of fixed stars, and with all the calculations respecting the visibility of southern stars in northern latitudes.

GALLEON (Sp. *galeon*), in the middle ages, a large, fast-sailing ship, carrying from 30 to 50 guns; at a later period, among the Spaniards, large armed ships of burden, with 3 masts and 3 or 4 decks, employed especially in transporting treasure from the American colonies.

GALLEY (Fr. *galère*), a long and narrow vessel, low-built, with one deck, propelled by oars and sails, and much used in the Mediterranean until the middle of the 17th century. It was substituted for the ancient trireme under the Byzantine empire, and was adopted by the Venetians and Genoese. It had 2 masts with lateen sails, and those of the largest size were about 166 feet long and 32 broad, with 26 pairs of oars, and carried about 1,000 men, with munitions and provisions for 2 months. The rowers were usually Turkish prisoners or convicts condemned to the oars and chained to the benches on which they sat. This service was deemed one of the severest penalties. The galleys of the knights of Malta were constantly in pursuit of the Mussulmans, and the battle of Lepanto was gained by the galleys of Spain, Venice, and the Holy See over those of Turkey. Galleys were long employed against the Barbary privateers. After the invention of gunpowder the artillery of the galleys usually consisted of 5 cannon in the fore part, 12 swivels on the sides between the oars, and 2 swivels in the stern.—Galleys were formerly used in France, Spain, and the Italian republics, as places of punishment for criminals condemned to hard labor. They were employed as rowers of the galleys, and were called by the English galley slaves. The custom was discontinued in the reign of Louis XIV., when galleys ceased to be used in the navy. The name bagnio is now applied to the prisons which took the place of the galleys.

GALLIA, a S. co. of Ohio, separated from Virginia on the E. by the Ohio river, and drained by Raccoon and Symmes creeks; area, about 420 sq. m.; pop. in 1850, 17,063. It has a rough surface, underlying which are beds of coal and iron. The soil is generally poor except in the vicinity of the Ohio. The productions in 1850 were 877,865 bushels of Indian corn, 62,095 of wheat, 96,831 of oats, 7,908 tons of hay, and 172,131 lbs. of butter. There were 2 grist mills, 1 saw mill, 1 iron foundry, 1 woollen factory, 2 newspaper offices, 22 church-

es, and 2,819 pupils attending public schools. The county was settled by Frenchmen in 1790, whence its name. Capital, Gallipolis.

**GALLIC ACID**, a product of the decomposition of tannic acid or tannin, obtained in slender, silky needles or crystals. When pure, these are colorless, without odor, and of a sour and astringent taste. They are soluble in 100 parts of cold, or 3 parts of boiling water. Their solution decomposes by exposure to the air. The decomposition of the crystals dried at 212° F. is supposed to be represented by the formula  $\text{HO}, \text{C}, \text{H}, \text{O}_2$ , though they may perhaps retain an atom of water, in which case it is more correctly  $2\text{HO}, \text{C}, \text{HO}_2$ . Gallic acid is a useful reagent for detecting the presence of iron in solutions. It does not possess the property of the solution of galls of precipitating gelatine. It is employed in medicine on account of its astringent property, particularly for arresting internal hemorrhages. It is thought to be more readily absorbed than other astringents, and thus to reach more effectually distant parts of the system, while it does not produce, like others, constipation of the bowels. Several methods are in use for obtaining it, either directly from the galls or from the solution of tannic acid first, extracted from them. The powdered galls are made into a paste with water, and exposed for some weeks to the air at a temperature of 70° to 75° F., water being occasionally added to keep the paste moist. The residue, after expressing the paste to free it from the liquid portion, is boiled in pure water, and filtered while hot; the crystals of gallic acid separate as the solution cools. They should be purified by redissolving and boiling with a little animal charcoal or filtering through the same. As the presence of the smallest quantity of sesquioxide of iron will cause the crystals to be colored, the charcoal should be purified, and the filtering paper be washed with dilute hydrochloric acid. Gallic acid is obtained from solution of tannic acid by precipitation with sulphuric acid, the mixture being heated to the boiling point, and allowed to stand a few days.

**GALLICAN CHURCH**, a name for the Catholic church in France. The exact meaning of the term is not settled; some use it as merely signifying the Catholic church in France, while more commonly it is applied to that church only so far as it holds to certain national privileges, doctrines, and usages. Those who have advocated these distinguishing peculiarities, in opposition to Rome, have therefore generally been called the Gallican party, while their opponents were known as the Roman, papal, or, in modern times, the ultramontane party. There was in the church of France from the beginning a strong feeling of nationalism, the most important manifestation of which is found in the pragmatic sanction of St. Louis (Louis IX.), issued in 1268, which made the paying of taxes to the pope dependent on the consent of the king and the national clergy, and forbade the interference of a foreign power in the affairs of the national

church. The spirit of independence was strengthened by the decrees of the councils of Constance and Basel, which were adopted by France at the assembly of estates at Bourges in 1438, and promulgated in the pragmatic sanction of Charles VII., the fundamental law of the Gallican church. This placed the general council above the pope, forbade the paying of taxes to the pope for appointing bishops and prelates, and abolished the annates after the death of the then living pope. This sanction was repealed by Louis XI. in 1461, but restored by Charles VIII., and by Louis XII. through the edict of 1496. Its most important points were again changed by the concordat concluded in 1516 between Francis I. and Leo. X., which granted most of the demands of the pope, and, notwithstanding the protestations of the parliaments and provincial estates, remained valid until the revolution of 1789. The Gallican church became entirely dependent upon the kings, who often found it to their interest to strengthen the Gallican rather than the Roman tendencies. Thus, some of the decrees of the council of Trent were not received by France, as incompatible with the constitution of the national church, and as too favorable to the influence of the pope. The most important event in the history of Gallicanism is the "Declarations of the French Clergy" (*Declarationes Cleri Gallicani*), which in 1682, by order of Louis XIV., was drawn up by Bossuet, and defined the liberties and doctrines of the Gallican church in the following 4 articles: 1, kings and princes are in temporal matters subject to no spiritual power, and the latter can never absolve subjects from the oath of obedience; 2, the pope is subject to the decisions of an oecumenical council; 3, the power of the pope is moreover limited, as far as France is concerned, by the established prescriptions and usages of the Gallican church; 4, also in matters of faith the decisions of the pope are not infallible when not confirmed by the consent of the whole church. These propositions were proclaimed by a royal ordinance, to which all the instructions of the theological schools were to be conformed; but in Rome they were publicly burned by the common executioner. Louis XIV., in order to restore peace with the head of the church, soon revoked them, but his revocation was not received among the laws of the French state or church, and the articles therefore remained valid, and formed the palladium of the Gallican party in the church. The French revolution overthrew the whole Catholic church in France. Napoleon, as first consul of the republic, reestablished it as a state church by a concordat with Pius VII., in 1801. To the concordat he added, April 8, 1802, organic articles, which enacted that the proclamation of papal decrees depends upon the discretion of the government; that there shall always be an opportunity for an appeal to the council of state against the abuses of ecclesiastical power; and that the teachers in the seminaries shall be always bound by the 4 propo-

sitions of the Gallican clergy. The pope and a majority of the bishops protested against the validity of the organic articles, and a synod convoked in 1811 at Paris refused to declare the church of France independent of the pope. Louis XVIII. concluded, June 11, 1817, a new concordat, by which that of 1801 was abolished, and that of 1516 restored. As, however, the chamber of deputies refused to ratify it, the new concordat never received legal sanction. Although the clergy had no opportunity to declare themselves in synods and councils on the relation of the Gallican church to Rome, it was generally known that a majority were in favor of strengthening the union with Rome, and opposed to defending any thing in the national church which was regarded by Rome as un-Catholic. The remarkable change of ecclesiastical views which has taken place in France since the beginning of the present century is in great part owing to the influence of the works of De Maistre and Bonald. In consequence of some agitation among the people, who were excited against the Jesuits, the government in 1824 demanded of the superiors of the episcopal seminaries, and in 1826 of the bishops, that they should bind themselves to the declarations of 1682. The July revolution of 1830 had but little influence on the inner development of the Gallican church. Louis Philippe made as great concessions to the hierarchy as the origin of his own authority would allow. The bishops whom he appointed were mostly opposed to the Gallican tendencies. An attempt made in 1831 by the abbé Châtel to establish a religious association under the name of the French Catholic church (*église catholique Française*), was at once regarded by the Catholics as being not a movement within but a secession from the national church. The establishment of the republic in 1848 gave to the church a liberty in ecclesiastical and educational affairs which she had not enjoyed for centuries. For the first time within more than 100 years the bishops held provincial and diocesan councils. It appeared that there still existed a difference of views between them concerning the relation of the French church to Rome; but it was no longer the same party division as formerly, the Gallican party of old being found to be almost extinct. All the bishops agreed that it was desirable to strengthen the union between Rome and France, especially in order to give to the national church greater strength to resist the secular rulers. One of the clearest proofs of the spirit now prevailing is the introduction of the Roman prevailing of the old national liturgies, which took place in one diocese after another, until in 1858 there were only 8 in which the Gallican liturgy was retained. Under Napoleon III. the bishops claim the right to meet without previous authorization in provincial councils; and the government, in order to avoid a conflict, has permitted them to do so without deciding the legal question. The whole French episcopate are at present in the greatest harmony with Rome.—

Some of the most important works on the Gallican church, its history and liberties, are: J. de Maistre, *De l'église Gallicane*; Dupin, *La liberté de l'église Gallicane* (Paris, 1824); Fraysinoux, *Les vrais principes de l'église Gallicane*; and an anonymous *Mémoire sur la situation présente de l'église Gallicane*, addressed to the bishops, and vindicating the Gallican church and its doctrines against the attacks of Count Montalembert.

GALLIENUS, PUBLIUS LICINIUS EGNATIS, a Roman emperor, born A. D. 235, died in 268. He was proclaimed Cæsar by the senate in 253, when his father Valerian was saluted as Augustus. After the latter was defeated and made prisoner in 260 by Sapor, king of the Persians, he governed alone, and saw the empire during his whole reign rent by usurpers, invaded by barbarians, and desolated by the plague. While he abandoned himself to revelry at Rome, nearly 30 of his armies in different parts of the kingdom each elected their general to be emperor, and the military anarchy which succeeded has been called the age of the 30 tyrants. He regarded with indifference the dismemberment of his states, and the dignity of the empire was maintained only in the East, where Odenatus inflicted a defeat upon Sapor. When the legions of Illyria in 268 proclaimed Aureolus emperor, he immediately marched toward Rome to depose Gallienus; but the latter, waking from his apathy, besieged the usurper in Milan, and perished in the siege.

GALLINULE, a wading bird, of the sub-order *gralla*, family *rallida*, and sub-family *gallinulina*; comprising the genera *porphyrio* (Briss.), *tribonyx* (Dubus.) from Australia, *gallinula* (Briss.), and *fulica* (Linn.); the last has been described in the article Coor. In the genus *porphyrio* (Briss.), or *porphyryla* (Blyth), the bill is short, thick, and strong, with the culmen much elevated at the base, and dilated on the forehead, with a large frontal plate and compressed sides; nostrils nearly circular; the wings and tail are short and rounded, the 2d, 8d, and 4th quills nearly equal and longest; the tarsi long and slender, with broad transverse scales; the toes very long and free at the base, claws long and somewhat curved. More than a dozen species are described, richly colored, inhabiting warm and temperate regions in pairs or small flocks, on the borders of lakes, rivers, and marshes; they prefer land to water, walk in a dignified manner, run lightly and quickly, and from the length of the toes are able to glide over the surface of floating water plants; their food consists chiefly of fruit, seeds, aquatic roots, and small fish and mollusks; their nest is concealed in the high reeds near the water's edge, made up of dried grasses, and the usual number of eggs is 3 or 4. The only American species is the purple gallinule (*P. martinica*, Linn.), with the head and lower parts fine bluish purple, darker and often nearly black on the abdomen and tibia; the sides and under wing coverts bluish green, and

lower tail coverts white; upper part of body dark green shaded with olive, and tinged with brown on the back and rump; quills and tail brownish black, with green outer edging; bill bright red with yellow tip, frontal plate blue, iris bright carmine, tarsi, toes, and claws yellow. The length to end of tail is about 13 inches, extent of wings 21½, tarsus 2½; weight about 8 oz. It is distributed over the southern states, and is accidental in the middle and northern; it is found also in South America. It runs, swims, dives, and flies well; when travelling far its flight is high, but low and short in its feeding or breeding grounds; it alights with the wings spread upward like the rail; the rapid jerking motions of the tail when alarmed are very remarkable; it sometimes alights on ships 200 or 300 miles from land. Its flesh is not generally held in estimation. It breeds at the south, very early in the year; the nest is built of rushes, 2 or 3 feet from the ground, and is about 10 inches in diameter on the inside; the eggs, from 5 to 7, are of a light grayish yellow, with blackish brown spots; the young, at first nearly black, are fully fledged by the 1st of June.—In the genus *gallinula* (Brisson) the bill is shorter and less stout, the tarsi are stronger, and the toes are margined by a slight membrane throughout their length, though in no way comparable to the pedal lobes in the coot. There are about 12 species in various parts of the world, living on the borders of slow and deep streams edged with reeds; they are more aquatic than the preceding genus, preferring water to land, swimming well and striking the water with the tail; they are excellent fliers and divers, and swim under water by means of their wings; they also walk well, flirting up their tails, and run swiftly among the reeds and through narrow places; they can pass lightly over the leaves of aquatic plants; they eat slugs, worms, insects, grains, &c.; the nest resembles that of *porphyrio*, the number of eggs is 8 to 10, and the young take to the water as soon as hatched. The American species is the Florida gallinule (*G. galeata*, Licht.), very closely resembling the *G. chloropus* (Linn.) of Europe; the principal differences seem to be that in the American bird the frontal plate is quadrate instead of acute, and the toes are longer. The head, neck, and under parts are deep bluish gray, blackish on the head and neck, and lighter on the abdomen; few feathers on the sides edged with white; lower lid, lateral lower tail coverts, edge of wing at shoulder, and outer edge of 1st primary, white; back and wings deep olive, darker on the rump; quills dark brown; tail brownish black; frontal plate and bill bright red, tipped with yellow; bare space on the tibia next to the feathers red; rest of legs yellowish green. The length to end of tail is about 13 inches, extent of wings 22; weight 12 oz. The female is like the male. This species is common in the winter along the rivers, ponds, and lakes, from eastern Florida to Texas, whence it migrates in spring and sum-

mer to the Carolinas, and occasionally even to the middle and northern states; it is also found in South America. It is both nocturnal and diurnal in its habits, often seeking for food on land, walking and nipping insects and grass like the common fowl; it is rarely seen on salt water, but sometimes in the winter visits the banks of bayous in which the water is brackish. The nest is generally a few feet from the water, among the rankest weeds; the eggs, about an inch and a half long, are of a dull dark cream color, with reddish brown and umber spots and dots; when the female leaves her nest she covers the eggs to protect them from crows and other enemies, and both sexes incubate; if not disturbed, they will hatch several broods in a season.

GALLIO, JUNIUS, a brother of the philosopher Seneca, adopted by the rhetorician Junius Gallio, whose name he assumed, died in A. D. 65. He was in 53 and 54 proconsul of Achaia under Claudius, and resided at Corinth, where he refused to listen to charges brought by the Jews against the apostle Paul on "a question of words and names, and of your law" (Acts xviii. 15). From him the name of Gallionism has been applied to indifference to the diversities of religions.

GALLIPOLI (anc. *Callipolis*), a town of Roumelia, European Turkey, 120 m. W. S. W. from Constantinople; pop. about 80,000. It is situated on a peninsula at the N. W. extremity of the Dardanelles, and was formerly well fortified. Its streets are narrow, dirty, and ill built, but its bazaars are large and abundantly supplied with goods. It has many mosques, fountains, Byzantine ruins and monuments, and manufactures of cotton, silk, and fine morocco leather. It has 2 harbors, and frequently receives the imperial fleets. It is the see of a Greek bishop. Gallipoli was formerly of great importance as a centre of the Greek and Italian commerce and as the key of the Dardanelles. The commerce is still considerable in grain, wine, silk, and oil, chiefly in the hands of the Greeks.

GALLIPOLI, a fortified seaport town of Naples, on an island in the gulf of Taranto, 29 m. W. S. W. of Otranto, connected with a suburb on the mainland by a bridge; pop. 8,500. It is well built, with a castle and fine cathedral, and is the great mart for the oil of Apulia, which is collected in extensive tanks excavated in the limestone rock.

GALLITZIN, GOLYZIN, or GALIZIN, a princely Russian family, numerous members of which have distinguished themselves as soldiers, statesmen, or authors. Their origin is traced back to Gedemin, prince of Lithuania, and the ancestor of the Jagiellos. I. MIHAIL commanded, in 1514, a Russian army against the Poles under Prince Ostrojski, was defeated, taken, and held in captivity for 38 years, together with his brother Dmitri, who died in the last year of their detention. Released by King Sigismund II., Mihail was received with distinction by the czar, but retired to a con-

vent, where he died. II. VASIL, defended Novgorod against the first pseudo-Demetrius, but soon followed the example of Basmanoff in espousing the cause of the pretender (1605); stained his hands with the blood of the son and widow of Boris Godunoff, his late master; was rewarded by the usurper, but conspired against him, and contributed to his fall and violent death (see DEMETRIUS); took part also in the conspiracy which overthrew his successor, Basil Shuiski, and was a chief member of the deputation which offered the throne of Moscow to Ladislas, the son of Sigismund III. of Poland. Offended by the conditions of the offer, the Polish king held the Russian envoys in arrest at Kiev, where Vasil died before the termination of the war between the two states. III. VASIL, surnamed the Great, born in 1633, received a classical education, fought against the Turks, Crimean Tartars, and Cossacks, and was made attaman of the latter; was active in bringing about the great reforms of Czar Fedor Alexievitch; was, after the death of that czar, treated with particular distinction by his sister, the princess regent Sophia; concluded in 1686 a favorable treaty with Poland; commanded in a new expedition against the Tartars of Crimea; promoted the ambitious designs of Sophia against her brother Peter the Great, and fell with her. He was tried, condemned, and confined to Yarensk in the government of Vologda, allowed to return to one of his estates on the intercession of other members of the family, but banished again in 1698 to a cold and dreary district in the government of Archangel, where he died. IV. MIHAIL, born about 1675, served in the guards of Peter the Great, and accompanied that monarch on his various campaigns; distinguished himself at the taking of Schlüsselburg; won a victory over the Swedes at Dobry in Lithuania (1708); defeated the reinforcements of Charles XII. under General Lewenhaupt at Liesno; fought in the battle of Pultowa (1709), and a few days after compelled the remnants of the Swedish army to surrender; accompanied the czar on his disastrous expedition to the Pruth (1711); was rewarded for his services with the most flattering honors, and was sent as commander-general to Finland, where he was victorious on land and sea, and remained till the peace of Nystadt (1721). He was made field marshal by Catharine I., the wife and successor of Peter, was also distinguished during the following reign of Peter II., and died in Moscow, Dec. 1730. V. ALEXANDER, son of the preceding, born Nov. 1718, served under Prince Eugene on the Rhine (1733), fought in the 7 years' war, commanded a Russian army on the Dniester in 1768, took Chocim, and died in 1783. VI. DMITRI, born in 1721, was ambassador to the court of Vienna, became by his will the founder of a magnificent hospital in Moscow, and died in 1793. VII. DMITRI, born in 1738, was sent in 1763 as ambassador to France, where he became acquainted with the most eminent men of the age; married Amalia, daughter of Count Schmet-

tau; went in 1773 as ambassador to the Hague; retired after the conquest of Holland by the French to Brunswick, wrote on natural sciences, and died in 1803. Among his works are a *Description de la Tauride* (1778), and a *Traité de la minéralogie* (1792). VIII. AMALIA, wife of the preceding, born in Berlin, Aug. 28, 1748, made the acquaintance of Prince Dmitri at Aix la Chapelle, was married to him, but afterward lived in separation from her husband, first in the vicinity of the Hague, and subsequently at Münster in Westphalia, where she became the centre of a circle of pietistic writers, being herself remarkable for literary accomplishments as well as personal attractions. She contributed not only to the peculiar religious development of her son Demetrius (see GALLITZIN, DEMETRIUS AUGUSTINE), but also to the conversion of Count Frederic Stolberg to Catholicism. Goethe was among her visitors, and Hemsterhuys addressed to her, under the name of Diotima, his *Lettre sur l'athéisme* (1785). She died Aug. 24, 1806. IX. SERGHEI fought against the Turks, under Potemkin, against the Poles in 1794, and against the Austrians in Galicia in 1809, commanding the troops which assisted the Poles to drive back the archduke Ferdinand, when he died. X. EMANUEL, born in Paris in 1804, studied in that city, entered the Russian army, distinguished himself at the taking of Varna, returned to France, travelled subsequently through Russia and other countries, wrote, translated, and edited in French a number of works on Russia and its literature, especially descriptions of travels, and died at Paris in Feb. 1853.

GALLITZIN, DEMETRIUS AUGUSTINE, a Russian nobleman, who exercised the functions of a missionary priest in the United States, born at the Hague, Dec. 22, 1770, died in Loretto, Penn., May 6, 1840. His father while Russian ambassador in Paris had gained the friendship and embraced the principles of Voltaire and Diderot; his mother, the countess of Schmettau, had similar inclinations; and the young Demetrius, while educated in all secular learning and accomplishments, was strictly debarred from a knowledge of religion. In his 17th year, however, he became a member of the Roman Catholic church, which his mother had joined a short time before. His father designed him for the army, and in 1792 he was aide-de-camp to Gen. Van Lilien, who commanded the Austrian forces in Brabant during the first campaign against the French. After the death of the emperor Leopold and the assassination of the king of Sweden, Austria and Prussia dismissed all foreigners from their armies; and his own country being at peace, Demetrius resolved to travel in America. He was accompanied on the voyage by a young German missionary, the Rev. Mr. Brosius, who improved the influence which his position as tutor gave him over the young prince's mind to turn his thoughts toward the priesthood. Soon after landing, in 1792, Demetrius entered the theological seminary recently founded by the Sulpicians in Baltimore,

and on March 18, 1795, he was ordained priest by Bishop Carroll, being the second Roman Catholic upon whom that order was conferred in the United States. He also joined the society of Sulpicians, but subsequently, finding his relations with the latter inconsistent with the life of a missionary, he unwillingly broke them off. His first pastoral charge was at Cone-wango, Penn., whence he officiated at various towns in the states of Pennsylvania, Maryland, and Virginia, until in 1799 he selected a bleak uncultivated spot, high up on the Alleghany mountains in Cambria co., Penn., about 250 m. from Philadelphia, as the site of a proposed Catholic colony. He purchased a large tract of land, which he divided into small farms and sold at a nominal price, or oftener gave away, to emigrants, erected saw and grist mills, and having laid the foundation of a town, named it Loretto. To meet the heavy debt which he thus incurred he relied upon his patrimony; but on the death of his father in 1803, the Russian government, in consequence of the son's change of religion, refused to allow him to succeed to the estate, and he was consequently involved for a time in great embarrassments. Some assistance from his relatives, however, from the king of Holland, one of his early friends, and from the Russian ambassador at Washington, relieved him, and he expended on his settlement about \$150,000. His life was peculiarly austere and laborious. His plain log cabin was always open to the poor and strangers, his dress was of the simplest homespun, and he concealed his rank under the assumed name of "Father Smith." There were at that time few Catholic priests or churches in Pennsylvania, and Father Gallitzin added to the care of his flock at Loretto incessant journeys over a wild and extensive region. He found time to compose several controversial works which were extensively read; his "Defence of Catholic Principles," "Letter to a Protestant Friend," and an "Appeal to the Protestant Public," are still often reprinted. He was several times proposed for the episcopacy, but would never accept that honor. At his death he left a flourishing community of 6,000 persons at Loretto. His name has since been given to a village there, and a monument was erected to his memory before the church in 1848.—ELIZABETH, Princess Gallitzin, cousin of the preceding, born in 1796, died in St. Michael's, La., Dec. 8, 1848. She abjured the Greek faith, joined the society of the sacred heart in Rome, and in 1840 was sent to America as visitatrix of the order. She founded an establishment in New York, and another in the far west at Potawatamie village.

**GALLON**, an old English measure of capacity, subdivided into 4 quarts. Formerly there were gallons of different capacities, one for wine, another for ale or beer, and a third for grain and dry goods. The wine gallon, called also the standard gallon, contained 231 cubic inches, the ale gallon 282 cubic inches, and the

corn gallon 268.6 cubic inches. In 1825 the imperial gallon was established by the British parliament, the capacity of which was 10 lbs. avoirdupois of distilled water, that weighed 252.458 grains to the cubic inch, thus making its contents 277.274 cubic inches. The gallon of the United States is the standard or Winchester wine gallon of 2.81 cubic inches, and contains 8.3388822 avoirdupois lbs. or 58872.1754 troy grains of distilled water at 89.88 F., the barometer being at 80 inches. The gallon of the state of New York is of the capacity of 8 pounds of pure water at its maximum density, or 221.184 cubic inches.

**GALLOWAY, JOSEPH**, an American loyalist, born in Maryland about 1780, died in England in Sept. 1803. He was educated for the bar, and in early life removed to Philadelphia, where he attained considerable eminence in his profession. In 1764 he became a member of the Pennsylvania assembly, and joined his friend Dr. Franklin in advocating the adoption of a royal government for the colony instead of the proprietary form then in use, which involved him in a controversy with John Dickinson. Subsequently he became speaker of the assembly, and in 1774 a delegate to the first congress. In this body he took a prominent part, and proposed to settle the difficulties between the colonies and the mother country by vesting the government in a president-general of the colonies, to be appointed by the king, and a council to be chosen by the several colonial assemblies; the British parliament to have the power of revising the acts of the latter body, which in its turn was to have a negative on British statutes relating to the colonies. The plan, though advocated by a few members, was rejected by congress; and the author, who had never been in favor of a political separation from Great Britain, although he had warmly urged the redress of the grievances which the colonists suffered, abandoned the whigs after the question of independence had begun to be agitated, and thenceforth was known as a zealous tory. He remained with the British army in Philadelphia and New Jersey until 1778, when he went with his daughter to England, where he passed the remainder of his life. Being summoned in 1779 before a committee of the house of commons to testify on American affairs, he animadverted severely on the course of Gen. Howe and other British officers. A new edition of this "Examination" was published in Philadelphia in 1855 by the "Council of the Seventy-Six Society." Galloway's estate, estimated to be worth £40,000, was confiscated upon his departure for Europe; but a large portion was subsequently recovered by his daughter. His literary remains comprise a "Speech in answer to John Dickinson" (8vo., London and Philadelphia, 1764); "Candid Examination of the Mutual Claims of Great Britain and the Colonies" (8vo., New York, 1775); "Letters to a Nobleman" (8vo., 1779); "Reply to Sir William Howe" (1780), &c. In the latter part of his life



he became interested in the scriptural prophecies, and wrote on the subject.

GALLS, or GALL NUTS, hard woody excrescences, in size from that of a pea to that of a nutmeg, formed by an insect on the twigs of the dwarf oak, *quercus infectoria*, in Syria and Asia Minor. (See GALL INSECTS.) They are brought to the United States principally from Smyrna and Trieste, and, being produced near Aleppo, are often called Aleppo galls. They are also obtained from Calcutta, to which place they are supposed to have been carried from Persia. Those are the best which are gathered when of good size, but before the insect by which they are produced has eaten its way out. They are known as black or blue galls, and possess in a higher degree the dark coloring property and the medicinal virtues of the article than the larger ones, from which the insect has escaped, and which are known as white galls from their lighter dingy color. About the season of gathering the galls they are carefully examined upon the trees, in order to collect them in their best condition. They are then of a dark bluish or lead color without, and internally whitish or brownish, hard and rough, with a knotted surface. They are solid, but easily broken, and form when ground a light yellowish gray powder. In the centre is a spot or cavity, caused by the presence of the larva or insect. Their taste is bitter and disagreeable, but they are without odor. They are powerfully astringent, and have been used in medicine since the time of Hippocrates; but excepting as a gargle in the form of infusion or decoction, or for external application mixed with some ointment, they are now little employed. Their chief value is in their soluble portions, producing black dyes when mixed with solutions of sulphate of iron. The portion that is soluble is taken up by 40 parts of boiling water. Ether takes up  $\frac{1}{4}$ , alcohol  $\frac{1}{8}$  of the galls. The solution serves to detect the presence of iron in other solutions. Galls are used as a source of tannin or tannic acid, the principal ingredient in their composition, as appears by the following analysis of Guibourt: tannic acid, 65; gallic acid, 2; ellagic and luteo-gallic acids, 2; brown extractive substance, 2.5; gum, 2.5; starch, 2; sugar, 1.3; chlorophyl and volatile oil, 0.7; woody fibre, 10.5; water, 11.15; total, 100. It is questionable whether the gallic, ellagic, and luteo-gallic acids exist in the substance of galls, or are produced by the action of the oxygen of the air upon the tannic acid, this being easily thus converted into other acid compounds. The tannin is separated by treating the powdered galls with ether mixed with about one-tenth part of water protected from the air. The greater part of the tannin thus extracted separates from the ether by standing, and is obtained in a concentrated aqueous solution. The aqueous solution of galls possesses the property of precipitating gelatine from its solutions, by the tannic acid it contains.

GALLUP, JOSEPH ADAM, an American physician and author, born in Stonington, Conn.,

March 30, 1769, died in Woodstock, Vt., Oct. 12, 1849. He had not the advantages of a collegiate training, although he received a very thorough education, and in 1798 he was graduated as bachelor in medicine at Dartmouth college. He practised medicine a few years in Hartland and Bethel, Windsor co., Vt., whence he removed to Woodstock in Jan. 1800. His first writings appeared in 1802 in the "Vermont Gazette," published at Windsor, and attracted early attention. For 8 years commencing in 1820 he was president of and a professor in the institution at Castleton, Vt., then called the Castleton medical academy, and was also for several years a lecturer in the medical department of the university of Vermont. He subsequently established the medical institution at Woodstock, called at the outset the clinical school of medicine, and delivered his first course of lectures there in the spring of 1827. This school afterward became the Vermont medical college, and was incorporated in 1835. In 1815 he published "Sketches of Epidemic Diseases in the State of Vermont," to which are added "Remarks on Pulmonary Consumption," which was republished in England. He published in 1822 his "Pathological Reflections on the Supertonic State of Disease," beside other pamphlets, and in 1839 his more considerable work in 2 vols., entitled "Outlines of the Institutes of Medicine, founded on the Philosophy of the Human Economy in Health and Disease."

GALT, JOHN, a Scottish author, born in Irvine, Ayrshire, May 2, 1779, died in Greenock, April 11, 1839. After spending some years in mercantile life he began to study law at Lincoln's Inn, London, but in 1809 set out on a tour of nearly 8 years in southern Europe and the Mediterranean, publishing the results of his observations on his return in two books of travels. He sailed from Gibraltar to Malta with Lord Byron and Mr. Hobhouse, and in the Levant he schemed to introduce British goods into the continent by way of Turkey in defiance of the Berlin and Milan decrees. He had in 1803-'4 contributed to the "Scots' Magazine" portions of an ambitious composition in octosyllabic verse. He next produced a volume of dramatic pieces, which Scott called "the worst tragedies ever seen," and which was followed by lives of Benjamin West and Cardinal Wolsey, a tragedy entitled the "Appeal," acted in Edinburgh for a few nights, and "The Earthquake," a novel in 3 volumes. These works, written in the intervals of various commercial undertakings, made no impression upon the public, but his "Ayrshire Legatees," which appeared in successive numbers of "Blackwood's Magazine" in 1820-'21, unexpectedly turned the popular tide in his favor. Within the next 8 years appeared the "Annals of the Parish," generally esteemed his best work, written 10 or 12 years before, but then rejected by the publishers, the "Provost," which he himself preferred, the "Steamboat," "Sir Andrew Wyllie," the "Gathering of the West," the "En-

tail," "Ringhan Gilhaize," the "Spaewife," "Rothelan," and the "Last of the Lairds," all novels of Scottish life, and all successful. The character of Leddy Grippy in the "Entail" was a special favorite with Byron. In 1826 he visited Canada as the agent of the Canada company, a large landholding corporation; he founded in the forest the town of Guelph, but a difference with his employers having cast him adrift again, he returned to England in 1829, and shortly afterward took advantage of the insolvent debtors' act. He returned to his literary labors, and during the remainder of his life produced a number of novels and a variety of miscellanies, including a "Life of Lord Byron," the "Autobiography of John Galt" (2 vols., 1833), and "Literary Life and Miscellanies of John Galt" (8 vols., 1834). His novel "Laurie Todd" (1830), relating some of his experiences in the new world, is considered in his best vein. It was followed by "Southenman," "Bogle Corbet," "Stanley Buxton," the "Member," the "Radical," "Eben Erskine," and the "Lost Child." He died after 14 strokes of paralysis, having dictated compositions long after losing the use of every limb. His works are of very unequal merit, but are usually marked by an original quaintness and vigor and by defects of taste. The facility with which he wrote is attested by the fact that notwithstanding many years of his life were surrendered to business pursuits he published 44 works, of which 24 were novels, many in 3 vols.

GALVANI, ALOISIO, or LUIGI, an Italian physician, the discoverer of that branch of electricity which bears his name, born in Bologna, Sept. 9, 1737, died there, Dec. 4, 1798. Being of a devotional turn of mind in his youth, he was educated for the priesthood; but his tastes subsequently inclined toward the natural sciences, and abandoning theology he took the degree of M.D. at the university of Bologna in 1762. Soon after he was appointed medical lecturer at the institute of Bologna, to the "Memoirs" of which he became a frequent contributor, and increased his reputation by treatises on the urinary organs, and the organs of hearing in birds. In 1786 accident led him to his great discovery in physical science. (See ANIMAL ELECTRICITY.) During the French occupation of Italy he was deprived of his offices, and his pecuniary resources and health began to decline. The death of his wife also afflicted him greatly. Under the weight of these misfortunes he sank rapidly, and although his offices were subsequently restored to him, he died before resuming their duties.

GALVANISM. See ANIMAL ELECTRICITY, and ELECTRO-DYNAMICS.

GALVANIZED IRON. Sheets of iron superficially coated with zinc are said to be galvanized, though the methods usually practised of applying this coating do not require the use of the galvanic battery. By Mallet's process the sheets are first cleansed by immersion in a warm bath of equal parts of sulphuric or hy-

drochloric acid and water, followed by hammering and scrubbing with emery and sand. They are then placed in a preparing bath of a saturated solution of hydrochlorate of zinc and sulphate of ammonia; and from this they are removed to a metallic bath composed of 202 parts by weight of mercury and 1.292 parts of zinc. To every ton weight of the amalgam one pound of potassium, or better of sodium, is added. At the temperature of 680° F. the compound fuses, and the zinc is deposited upon the iron sheets; the iron at the same time is attacked so strongly, that in a few seconds a plate an eighth of an inch thick would be dissolved, if allowed to remain. Small articles are most advantageously treated after the strength of the mixture has been somewhat spent upon larger ones. Another method is to plunge the cleansed sheets of iron into a bath of melted zinc covered with sal ammoniac, and stir them about for some time. Undiluted commercial acids are also used for cleaning the surface of the iron, in which case some bits of zinc are immediately added, which dissolves and is directly precipitated, forming a film upon the iron. When coated the articles may be applied to use, or they may be made still more effectually to resist the action of oxidizing agents by next dipping them in a bath of melted tin. This metal then forms the exterior coat, and adheres much more firmly than if it had been applied directly to the iron.—The first attempt to protect iron for practical purposes from rusting, by means of the application of an unoxidizable metal, was made by Prof. John W. Revere, M.D., of New York. On March 17, 1829, he brought before the lyceum of natural history of New York the results of experiments upon which he had been occupied the 2 preceding years, and exhibited iron spikes which after being driven into a block of wood had been left since June 14, 1827, in sea water; also an iron plate, secured to wood with iron nails, which had been similarly exposed. These did not present the slightest appearance of corrosion. Dr. Revere at first looked only to the preservation of the iron fastenings used in copper sheathing; but his experiments satisfied him that the sheathing itself might be of iron sheets protected from all danger of rusting by electrochemical agency. This invention was patented in the United States and England, and either according to his original method, or by the same slightly modified, has been ever since extensively applied in practice.

GALVESTON, a S. E. co. of Texas, bordering on the gulf of Mexico and on Galveston bay, and including a long narrow island of the same name separated from the mainland by West bay; area, 680 sq. m., of which 406 sq. m. are land.; pop. in 1858, 6,922, of whom 1,208 were slaves. Its surface is generally level and its soil sandy and productive. The most valuable land is on Galveston island. In 1850 the productions were 5,780 bushels of Indian corn, and 4,705 of sweet potatoes.—GALVESTON, the capital of the county, a port of entry, and

the principal city of Texas, is situated at the N. E. extremity of Galveston island, and at the mouth of the bay of the same name, the entrance to which is by a narrow channel between the city and the S. W. point of the long peninsula of Bolivar; lat.  $29^{\circ}18'11''$  N., long.  $94^{\circ}48'$  W.; pop. in 1850, 4,177; in 1859 estimated at 10,000, about 1,000 of whom were negroes. The island is about 28 m. long and from  $1\frac{1}{2}$  to  $3\frac{1}{2}$  m. wide, intersected by many small bayous, diversified by several fresh water ponds, and bordered through its whole length by a smooth hard beach, which forms a pleasant drive and promenade. The bay is an irregular indentation, branching out into various arms, and receiving Trinity and San Jacinto rivers and Buffalo bayou. It extends 85 m. N. from the city to the mouth of Trinity river, and has a breadth of from 12 to 18 m. The harbor is the best in the state, and has 12 feet of water over the bar at low tide. There are several ship-building and repairing yards, good wharves, and large store-houses adjoining them. Nearly all the foreign trade of the state is transacted here, and the entrances and clearances from and to foreign ports during the year ending June 23, 1858, were as follows:

Vessels.	Entered.		Cleared.	
	Number.	Tonnage.	Number.	Tonnage.
American .....	14	4,231	81	14,041
Foreign .....	9	4,635	7	8,476
Total .....	23	8,866	88	17,517

The value of imports during the same period was \$71,881, and that of exports, \$2,428,465. The registered tonnage of the port was 3,589, and the enrolled and licensed 5,490; total 9,080. A large proportion of the trade, however, is carried on coastwise, and the total number of entrances during the year 1856 was 3,594, of which 1,065 were steamers. The principal business is shipping cotton, of which the annual receipts from the interior for exportation amount now (1859) to 800,000 or 400,000 bales. A large commerce is carried on with Brazoria by means of a canal. The Galveston, Houston, and Henderson railroad, now in course of construction, is in operation from Virginia point, on the mainland opposite Galveston, to Houston, a distance of  $42\frac{1}{2}$  m.; and a railroad bridge, nearly 2 m. long, from Galveston to Virginia point, across the bay, was to have been completed by Sept. 1859. Regular lines of steamers ply between this port and New York, New Orleans, the S. W. towns of Texas, &c. The city has several founderies and machine shops, cotton presses, hotels, &c., and in 1858 contained 8 or 10 churches, 2 of which, the Episcopal church and the Roman Catholic cathedral, are costly brick buildings in the Gothic style, a female seminary, an academy, a convent of Ursuline nuns, a number of common schools, a bank (the only one in the state), many elegant stores and private houses, and several newspaper offices. The Roman Catholic uni-

versity of St. Mary is a large brick structure at the E. end of the city; it was founded in 1854, incorporated with power to confer degrees in 1856, and is under the charge of the order of Minor Conventuals.—The island of Galveston was occupied by the notorious pirate Lafitte in 1817, and continued to be his headquarters until his settlement was broken up by Lieut. Kearney, commander of the U. S. brig Enterprise, in 1821. The growth of the city dates from 1837.

GALWAY, a maritime county of Ireland, in the province of Connaught, bounded N. by Mayo and Roscommon, E. by Roscommon, King's county, and Tipperary, S. by Clare and Galway bay, and W. by the Atlantic ocean; length from E. to W., 92 m.; breadth from N. to S., 57 m.; area, 2,447 sq. m., of which less than one half is arable, the rest being mountain, bog, or water; pop. diminished from 414,684 in 1841 to 298,564 in 1857, and in 1859 probably not much above 270,000. The western part of the county is rugged and barren. Here are the celebrated district of Connemara and Lough Corrib, one of the largest of the Irish lakes. The E. division is in general level and fertile. Agriculture is in a very backward state. The principal crops raised are oats, barley, and wheat, and the total extent of land under crops in 1855 was 233,696 acres. Grazing is much followed, and the cattle and sheep are greatly esteemed. Limestone and marble are the chief minerals, and a very beautiful species of the latter is obtained near Oughterard, in the neighborhood of which town there is also a lead mine. The coast fisheries would be valuable if properly prosecuted. The principal fishing districts are Galway and Clifden. Galway has some manufactures, the most important of which are woollen hosiery, coarse linens, and friezes for home consumption. Celtic cromlechs and Anglo-Norman castles are frequently to be met with in this county. It returns 4 members to parliament. Its chief towns are Galway, Tuam, Loughrea, and Gort.—GALWAY, an ancient seaport town, capital of the above county, is situated on the N. side of Galway bay,  $126\frac{1}{2}$  m. by rail from Dublin; lat.  $53^{\circ}15'12''$  N., long.  $9^{\circ}8'30''$  W.; pop. in 1851, 24,697. In the old town the streets are narrow, irregular, and dirty, but in the modern part they are in general spacious, handsome, and cleanly. The chief public edifices are the Queen's college, a beautiful building in the Elizabethan style, the collegiate church of St. Nicholas, which is in the decorated English style, and the Franciscan convent, a large and stately structure. There are several Roman Catholic chapels, monasteries, and nunneries, some Presbyterian and Methodist meeting houses, and two handsome court houses. Galway has few manufactures, but it has 2 breweries, 2 distilleries, a paper mill, a foundry, a tannery, and several flour mills in the town and neighborhood. It was formerly the principal emporium of Ireland, and the commerce was

considerable, especially with Spain. Latterly, however, it has fallen off greatly. The principal exports are corn, flour, kelp, marble, wool, and provisions. The chief imports are timber, wine, salt, coal, hemp, tallow, and iron. The entrances in 1856 were 88 vessels, tonnage 8,394, and the clearances 61 vessels, tonnage 6,185. It has a floating dock, which has an area of 5 acres, and admits vessels of 14 feet draught. On Mutton island, in front of the harbor, is a lighthouse 33 feet above high water. Galway returns 3 members to parliament.—In 1858 a regular steam service with New York, stopping at St. John's, Newfoundland, was commenced by Mr. John Orrel Lever, to whom, in 1859, Lord Derby's government gave a postal contract.

GAMA, VASCO DA, the discoverer of the route to India round the cape of Good Hope, born in Lines, a small Portuguese seaport, it is not known at what date, died in Cochin, India, Dec. 24, 1525. Bartholomew Dias, a Portuguese explorer, having visited the cape which he called *Cabo Tormentoso*, or stormy cape, brought back such interesting accounts of his discoveries that the Portuguese sovereign Emanuel, following the policy of his predecessor John II., determined to urge discovery beyond the point where Dias left it, and if possible to reach by sea the countries of the Indies. Accordingly an expedition was placed under the command of Vasco da Gama, a gentleman of the king's household, and a skilful and experienced mariner. The fleet consisted of the San Gabriel, flag ship of 120 tons, the San Rafael of about 100 tons, a caravel of 50 tons, and a store ship, with a total force of 160 men. The king presented Gama with the flag of the military order of Christ (a white cross within a red), also the journal of Covilham the navigator, who had 10 years before gone to India by way of the Red sea, and with letters to all known potentates, and to the mysterious Prester John. On July 8, 1497, Gama's expedition departed from Lisbon for the Cape Verd islands, whence it set sail on Aug. 3 southward along the African coast. For 3 months the voyagers pursued their way, harassed, as an early English narrator says, with torments of wind and rain. On Nov. 7 they put into a bay called St. Helena, near the cape, where they found the natives "lyttle men, ill favored in the face and of color blacke, and when they did speake it was in such manner as though they did alwayes sigh." Departing on the 16th, they encountered a succession of tempests such as had gained for the southern promontory of Africa the name of the cape of Storms. The courage of Gama's companions failed, and they besought him to put back, which he not only refused to do, but put the ringleaders of the movement in irons, and held on his course into the stormy sea. When they were beating about off the promontory, Gama fancied that he saw the spirit of the cape. Camoëns has sung this incident as a fact, while moderns, less poetical, say that the apparition could have been nothing more than that peculiar cloud whose sudden envelopment of the

cape is the forerunner of a storm. On Wednesday, Nov. 20, they doubled the cape of Storms, or rather, as Emanuel himself had named it ere the expedition set out, the cape of Good Hope. Proceeding along the coast, they touched at various points, among others at Natal. Further N. they discovered Mozambique, and came upon a country which exhibited a high stage of commercial advancement, the inhabitants having regularly built ports, with mosques. The natives were Mohammedans, carrying on a trade in pearls, rubies, silver, linen, and spices with Arabia and India. Gama took with him a pilot from this place. On April 1 the explorers discovered the island of Açotado, which Gama so named from a flogging he gave to his pilot there; and on the 7th the island of Mombassa, where the people who inhabited it were bravely apparelled in silken stuffs and jewelry. As these men tried to cut his cable, Gama seized a boat containing 17 of them, and carried them off to Melinda, 8° S. of the equator, where the king of the place entered into the most friendly relations with the Portuguese, and gave them a pilot to conduct them across the Indian gulf. Melinda was described as a regularly built city, with wide streets, and houses of more than one story. The Melindese pilot is reported to have been acquainted with the astrolabe, compass, and quadrant. Under his guidance the voyagers steered 750 leagues across the open sea. In 23 days they arrived off the Malabar coast, and on May 20, 1498, they reached Calicut, the object of their search. Their mission was thus accomplished, and a new route to the East established. Gama's relations with the ruler of Calicut, who was called the Samoudri-rajah (abbreviated to Zamorin), were not of a cordial nature; and therefore, leaving the Indian coast on Oct. 15, Gama returned to Lisbon, calling at Melinda on the way to take on board an ambassador to Emanuel's court, and arriving in the Tagus, Sept. 1499, after an absence of 2 years and 2 months. He brought back only 55 men and one ship, a caravel which he had chartered at Cape Verd. The San Rafael had been lost on the coast of Africa, the store ship burned according to Gama's instructions, the San Gabriel condemned at Cape Verd, and Nicolao Coelho had slipped away with the remaining vessel, in order to be the first to tell the great news in Portugal. The king received Gama splendidly, and permitted him to bear the high-sounding title of "lord of the conquest of Ethiopia, Arabia, Persia, and India." Emanuel immediately fitted out a second fleet of 13 ships, with 1,200 men, under the command of Pedro Alvarez Cabral, to establish trading posts; but failing in its ends, another fleet of 20 ships was placed under command of Gama. This expedition, which was warlike in its character, sailed early in 1502. On reaching the Indian seas Gama made a treaty with the kings of Sofala and Quiloa, the latter agreeing to pay tribute to Portugal. Determined now to strike terror into the hostile kings of the Indian coast, he seized a large ship containing

800 male and female pilgrims of the highest rank of various nationalities on their way to Mecca, and killed them all, excepting 20 children, whom he saved to bring up in the Christian faith, as an atonement for one of the Portuguese who had apostatized to Mohammedanism. This sanguinary affair at once opened to him the port of Cananore, whence he sailed to Calicut, seizing on the way 50 of the natives. Here he demanded the right to trade, with immediate reparation for past indignities, and, not receiving it promptly, he hung his 50 prisoners at the yard arm and burned the town. Thence he proceeded to Cochin, where he entered into friendly relations with the king, and presented him a golden crown from the king of Portugal. The Calicut Zamorin, however, made war on Cochin for this alliance with the strangers. Gama, leaving 5 ships to cruise on the coast, returned home with 18 ships, having a battle on the way with the Calicut fleet, which he utterly routed. On his return the king created him admiral of the Indian ocean and count of Vidigueria. For the next 21 years Gama lived in retirement, till 1524, when, the Portuguese dominion having largely expanded in the East, John III. appointed him viceroy of the Indies. He proceeded to his seat of government, but died in the succeeding year at Cochin. In person Gama was short and stout, with a florid complexion. The salient points of his character were intrepidity, perseverance, and fertility in expedient, but he was sudden and violent in anger. In 1558 his body was brought to Portugal and interred with honor. Barras has published an account of his voyages, and Camoëns celebrates them in his "Lusiad." Dr. Pertz, the director of the royal library in Berlin, has announced his discovery of documents which tend to show that the route to the East *via* the cape was known 200 years previous to Gama.

GAMALIEL, a Pharisee, doctor of the law, member of the sanhedrim, and teacher of Saul, who was afterward the apostle Paul, died about A. D. 88. In the Talmud he is surnamed Hazaken, "the Elder," to distinguish him from his grandson and is represented as grandson of Hillel, the renowned teacher of the Mishna. He held a seat, and probably the presidency, in the sanhedrim during the reigns of Tiberius, Caligula, and Claudius. When Peter and the other apostles were brought before the council in Jerusalem, after being miraculously released from prison (Acts v.), he recommended to "let them alone, for if this counsel or this work be of men, it will come to nought; but if it be of God, ye cannot overthrow it; lest haply ye be found even to fight against God." The respect with which his opinions are always quoted by the rabbins is irreconcilable with a tradition that he was converted to Christianity by Peter and John.

GAMBIA, a British colony of W. Africa, occupying both banks and some islands of the river whence it derives its name; pop. in 1851, 5,693, of whom 191 were whites. In 1858-59

there were 462 births, 871 deaths, and 110 marriages. The chief settlements are Bathurst, Fort James, and Fort George. Bathurst and Fort James are situated in St. Mary's island near the mouth of the Gambia; Fort George on McCarthy's island, about 180 m. from the sea. The climate is generally considered unhealthy. In summer the heat is excessive, the thermometer frequently rising to 106° and 108° in the shade. The soil is rich and alluvial, and liable to periodical inundation. The principal exports are beeswax, ground nuts, and hides, and the imports cotton goods, tobacco, amber, rum, &c. In 1855 there were in Gambia 7 schools, attended by 715 male and 634 female pupils. The revenue of the colony was £15,853, and the expenditures £15,210. There were entered 217 vessels of 32,619 tons, and cleared 215 vessels of 32,242 tons. The imports amounted to £126,454, and the exports to £215,804.

GAMBIA, a large river of W. Africa, rising in the interior of the continent, and after a course of more than 100 miles, discharging itself into the Atlantic ocean at Bathurst, in lat. 13° 30' N., long. 16° 40' W. It is 9 m. broad at its mouth, and is navigable for vessels of 800 tons burden for 90 m. inland.

GAMBIER, a post village of Pleasant township, Knox co., Ohio, founded in 1826 on a tract of land belonging to Kenyon college; pop. in 1850, about 280. The college, which is an Episcopal institution, was established under the auspices of Bishop Chase in 1826, by funds which he had collected in England. It is richly endowed, and comprises 4 buildings, the principal of which is an imposing stone edifice in the Gothic style, 190 feet long and 4 stories high. There are 5 professors, 50 students, a number of pupils in the preparatory department, and 8,720 volumes in the library. The commencement is on the first Wednesday in August. Connected with the college is the theological seminary of Ohio, founded in 1828, and having a president, 3 professors, and a library of 4,500 volumes. The village occupies a beautiful site on a high ridge nearly surrounded by Vernon river. It contained in 1850 an academy, a few stores, and the offices of 2 or 3 religious periodicals. It was named after Lord Gambier, a benefactor of the college, the latter being named after Lord Kenyon.

GAMBIER, JAMES, baron, a British admiral, born in the Bahama islands, Oct. 18, 1756, died at Iver, near Uxbridge, April 19, 1838. He was of a French Protestant family, expatriated by the revocation of the edict of Nantes. Early entering the naval service, he obtained in 1778 the rank of post captain, and as commander of the frigate Raleigh was engaged in repelling the French attempt upon Jersey in 1781, and afterward in the reduction of Charleston, S. C. In 1798 he was appointed to the command of the Defence, of 74 guns, under Earl Howe, and in the engagement with the French fleet under Villaret de Joyeuse (June 1, 1798) his ship was the first to break through

the enemy's line. Advanced to the rank of rear-admiral in 1795, and of vice-admiral in 1799, he became third in command of the channel fleet in 1801, and in the following year was intrusted with the government and defence of Newfoundland. In 1807 he commanded the fleet sent to Copenhagen with troops under Lord Cathcart to demand the surrender of the Danish navy. The bombardment of the city continued 3 days, when Admiral Gambier took possession of 19 sail of the line, 23 frigates and sloops, and 25 gun boats, together with the stores in the arsenal. He was rewarded with the dignity of baron, and with the offer of a pension, which he declined. In 1808 he was appointed to the command of the channel fleet, drew up a code of signals and the general disciplinary instructions for the navy, and in April, 1809, attacked the French squadron in the Aix roads and burned 5 of the ships. Lord Cochrane had command of the British fire ships (catamarans), and in consequence of a disagreement between him and Lord Gambier, the latter requested a court-martial, by which he was honorably acquitted. In 1814 he was appointed at the head of the commissioners to conclude a peace with the United States, and the treaty was signed at Ghent on Dec. 24. He afterward lived in retirement, received the grand cross of the order of the bath in 1815, and was made admiral of the fleet on the accession of William IV. He was distinguished for benevolence and piety, and as an officer exerted himself to promote religious observances among the seamen under his command.

**GAMBOGE**, or **CAMBOGE**, a gum resin of Siam and Cochin China, and produced also in Ceylon. The tree from which it is obtained is the *hoeradendron cambogioides* of Dr. Graham of Edinburgh. The gum was first carried to Europe by the Dutch in 1608. It is imported into the United States only from Canton and Calcutta. The manner of collecting it in Siam is to catch in leaves or cocoanut shells the yellow milky juice which exudes from the fractured shoots and leaves of the tree, and, transferring this to earthen vessels, leave it to thicken. It is poured when semi-fluid into the hollow joints of the bamboo, and thus receives the cylindrical form and the shape of pipes or hollow cylinders by contraction in solidifying. It is also made into lumps or cakes of several pounds weight; these are commonly more or less mixed with bits of wood and other impurities. Farinaceous matters are also employed to adulterate it, their presence being detected by the green color communicated to the decoction by adding iodine. The inferior kinds are known in commerce as coarse gamboge. Those of finer quality are brittle, with conchoidal fracture, of reddish orange color in the mass, but bright yellow in powder, or when rubbed with water. It is without odor, and its taste, very slight at first, is soon followed by an acrid sensation in the throat. Its emulsion with much water affords films, which are good microscopic

objects for the observation of active molecules. It is wholly taken up by alkaline solutions and by strong acids. Its resinous portion is dissolved by sulphuric ether; the whole by the successive action of ether and water. The following analyses are given by Dr. Christison of the different qualities of gamboge:

Constituents.	Siam Gamboge.			Ceylon Gamboge.
	Pipe.	Cake or lump.	Coarse.	
Resin .....	72.5	64.7	48.2	71.8
Soluble gum .....	22.7	20.8	15.2	19.9
Woody fibre .....	trace.	5.8	12.8	5.7
Fecula .....	...	5.6	14.5	...
Moisture .....	4.8	4.1	8.8	8.2
Total .....	100.0	100.0	100.0	100.0

The resinous portion is obtained by evaporating the ethereal tincture. It has a deep orange color, and gives a yellow tint to 10,000 times its weight of alcohol. It is entirely insoluble in water. Johnston named it gambogic acid, and gave its composition  $C_{10}H_{12}O_8$ . This is said to be an active purgative in the dose of 5 grains, without the drastic and nauseating character of the gum resin. Gamboge is employed as a water color, and also as a medicine. In large doses it is an acrid poison, a single drachm having produced death. It is best used in combination with other and milder cathartics, and is then found an excellent remedy for obstinate constipation. It is also employed in the treatment of apoplexy and dropsy.

**GAME LAWS**, statutes which declare what birds and beasts are to be considered game, and impose penalties on those who unlawfully kill or destroy them. The game laws of England had their origin in the ancient forest laws, under which the killing one of the king's deer was equally penal with murdering one of his subjects. From the Norman conquest to the present day game has constantly been a subject of legislation in England. In 1889 the possession of property was made a specific qualification for the privilege of killing game, and it was enacted that "no manner of artificer, laborer, nor any other layman who hath not lands and tenements to the value of 40 shillings by the year, nor any priest nor other clerk if he be not advanced to the value of 10 pounds by the year," shall keep hunting dogs, or use other methods of killing game, upon pain of one year's imprisonment. In 1605 the qualification to kill game was increased to £40 a year in land and £200 in personal property. In 1670 the qualification was limited to persons who had a freehold estate of £100 per annum, or a leasehold for 99 years of £150 annual value. Persons who had not these qualifications were not allowed to have or keep game dogs. In 1785 an act was passed requiring persons qualified to kill game to take out a certificate to that effect. The property qualification was abolished in 1881, since which time the certificate itself, which costs £3 18s. 6d., gives a qualification. It must be taken out annually, and expires in

July. The sportsman must show it when demanded by collectors of taxes, gamekeepers, landlords, occupiers, and lessees, and if he refuses is liable to a penalty of £20. Uncertificated persons caught sporting are liable to a penalty of £5 for each offence, though the owner or occupier of enclosed grounds has a right to kill hares on his own grounds without taking out a game certificate. There are many restrictions upon the right which a certificate gives to kill game. It must not be killed on Sunday nor on Christmas, nor at the season when the pursuit of each kind of game is prohibited. The law is very severe against poachers or unauthorized persons who destroy game by night. For killing game or rabbits on any land at night, or for trespassing upon such land with instruments for taking or killing game, the penalty is 8 months at hard labor in the house of correction; and if at the expiration of the term the poacher cannot give security for good behavior for a year, he may be further imprisoned for 6 months. A third offence is punishable with transportation for 7 years, or 2 years' imprisonment. It is felony to unlawfully hunt, kill, or wound any deer kept in any enclosed land, and the punishment is transportation for 7 years or imprisonment for 2 years. Lords of manors are authorized to appoint gamekeepers to preserve or kill game within the manors. Gamekeepers are authorized to arrest poachers, and to seize all dogs, nets, and other implements used for killing game by uncertificated persons. The sale of game in England is subject to very strict regulations. A dealer in game must obtain an annual license in July. Innkeepers, victuallers, retail beer-sellers, coachmen, guards, and common carriers are prohibited from dealing in game. The administration of the English game laws being entirely in the hands of the class interested in preserving the game, they are very rigidly enforced.—In the United States laws have been enacted by several of the states to protect game from pursuit during certain seasons in order to prevent its entire destruction. But apart from these restrictions, any person who chooses is at liberty to kill or capture as best he can any wild animal, bird, or fish, anywhere in the United States, subject only to the usual laws against trespassing on the grounds of other persons.

GAMING, the playing together of two or more persons at some game, whereby one shall lose and the other win money or other property staked upon the issue. The game may be one of chance, as that of faro, or a game with dice, or one of skill only, as chess, or of skill and chance together, as whist or backgammon. There is nothing immoral in playing for mere amusement; but if money be staked, it becomes easily, and perhaps necessarily, a sport carried on for the sake of the money, in a greater or less degree, and then most moralists have agreed that it deserves reprobation. When this is carried to an extreme degree, and important sums are played for, it is obviously wrong, and deem-

ed so to be universally. But the common law never interfered with gaming, by any kind of prohibition or restraint, so long as there was no fraud. If there was fraud, it operated here as it does elsewhere in law; it avoided all contracts, and money paid in fraud could be recovered back, because no title passed to the payee. And if one cheated at gaming, as by false cards, dice, or other implements, or indeed in any way, he might be indicted as a cheat at common law. Both in England and in the various states of the Union, statutes have been passed for the prohibition or restraining of gaming, or, as it is commonly called, gambling. Here, all gambling, that is, all playing for money, is prohibited, and therefore it is held that one cannot recover back money lost at play, because the playing itself is illegal; and it makes no difference whether the playing was honest or cheating. But a loser may recover his money from a stakeholder, by demanding it from him before he pays it over to the winner. It has been held in Indiana that winning any sum of money, however small, at cards, is an indictable offence. But it has been said in New York, that playing to see who shall pay for the use of the implements, as a billiard table, is not gambling.

GAMING HOUSES, houses kept for the purpose of enabling persons to gamble therein. These are said to be nuisances, and indictable as such at common law; but the keeping of them is prohibited and punishable by statute in most of the United States.

GAMMELL, WILLIAM, an American author, born in Medfield, Mass., in 1812. He is the son of the late Rev. William Gammell, who was settled in Newport, R. I. He was graduated at Brown university in 1831, and soon afterward was appointed a tutor in the university; in 1835 he was chosen assistant professor of rhetoric, and in 1836 professor of rhetoric, in the place of the late Prof. W. G. Goddard, who then resigned. He continued to perform the duties of that office till 1850, when he was transferred to the professorship of history and political economy. Prof. Gammell has published various orations and discourses on literary and historical subjects; also numerous articles in reviews and magazines, especially in the "Christian Review," of which, for several years, he was one of the editors. He has written a life of Roger Williams, and one of Governor Samuel Ward, for Sparks's "American Biography." He is also the author of a "History of American Baptist Missions," which was written at the request of the board of the American Baptist missionary union; a work which forms a most valuable contribution to the history of Christian missions. The writings of Prof. Gammell are marked by an elegance of diction and an earnest moral and religious tone.

GAMUT, in music, the scale on which the notes are placed in their several orders. Its invention is ascribed to the monk Guido Aretino, who commenced his scale with the note represented by the Greek letter Γ (gamma), corre-

sponding to the English G. Before his time musical scales commenced on A, one degree higher. (See ARRTINO, GUNDO.)

GANDO, a city and kingdom in Africa, lying on both sides of the principal branch of the Niger. The city is the residence of the sultan, and lies in a narrow valley surrounded by hilly chains. It is intersected from N. to S. by the broad and shallow bed of a torrent, the borders of which are covered with luxuriant vegetation, and it is adorned with a variety of trees, among which the banana is prominent. The onion of Gando is superior in size and quality to any produced in the neighboring districts. Though a central place and favorably situated for commerce, at the time of Dr. Barth's visit (May, 1853) it was extremely dull, and its commerce was insignificant, a fact which was explained by the anarchical state of the provinces around. The inhabitants prepare cotton cloth of excellent quality, but their dyeing is much inferior to that which distinguishes the manufactures of Nupe and Kano.—The kingdom of Gando consists of several rich provinces, comprising the western half of Kebbi, Mauri or Arewa, Zaberma, Dendina, a great part of Gurma, a small portion of Borgu or Barba, a large portion of Yoruba, Yaura, and Nupe or Nyfi. Much of the territory is well inhabited, and presents a luxuriant vegetation, embracing the yam, the date, and the banana. The inhabitants are of the Foolah race, and most of them Mohammedans. The latest rulers of the kingdom have been Aba Allahi, Mohammed Wani, and Khalilu, who, when visited by Dr. Barth in 1858, was in the 18th year of his reign. Khalilu lives in almost monastic seclusion, leaving the administration in the hands of one of his brothers, and the provinces have consequently been plunged into anarchy and mutual hostilities.

GANGES, the principal river of Hindostan, rising on the S. slope of the Himalaya mountains, and falling into the bay of Bengal. Its remotest feeder is the Bhagirathi, which issues from a wall of snow, supposed to be 800 feet thick, in the territory of Gurhwal, between the mountains St. Patrick, St. George, and the Pyramid, at an elevation of 13,000 feet above the sea. Thence it flows N. W. to Bhairogathi, where it is joined by the Jahnvi, a considerably larger stream than itself, and bends westward and then S. W. At Sookhee, in lat. 80° 59' N., long. 78° 45' E., it breaks through the Himalaya proper at an elevation of 7,608 feet, its average descent from its source having been 70 feet per mile, though to Bhairogathi it is 255 feet. Its general course is then S. W., S., and S. E., to Deoprag or Devaprayaga, in lat. 80° 8', long. 78° 39', where, 120 m. from its source, it receives the large river Aluknunda, and first takes the name of Ganges. Thence it flows W. and S. W., receiving on the right the Sooswa, and on the left the Nyar, to Hurdwar, 47 m. Its direction is now nearly S. for about 180 m.; thence S. E., receiving about midway the Ramgunga on the left and the Kallee Nuddee on the

right, 868 m. to Allahabad, where it is joined by the Jumna on the right. Down to this point it is full of shoals and rapids, and in many places fordable, though navigable by small boats from Hurdwar, and by passenger steamers from Ghurmuckteesur, 398 m. above Allahabad. From the latter place its course is generally E. for about 500 m. to Sikrigalee, and thence the main stream flows S. E. to its mouth. At Manjhee, 270 m. below Allahabad, it receives the Gogra; 18 m. below this, the Sone; 20 m. further down the Gunduck, and 160 m. further the Coosy. At Seebgunge, 95 m. from the mouth of the Coosy, and 568 from Allahabad, it sends off to the S. a large branch called the Bhagruttee, and 70 m. lower down another called the Jellinghee, which two offsets unite and form the Hoogly, considered by the Brahmins the true channel of the sacred river. The main stream below the divergence of the two feeders of the Hoogly is known as the Podda or Ganges. It throws off several branches, among which are the Konaie, the principal outlet of the Bramapootra, and the Kirtynassa, and 65 m. below the latter it unites with the Meghna, which carries its remaining waters to the sea, its mouth being in lat. 23° 52' N., long. 89° 45' E. The total length of the Ganges, reckoning from the source of the Bhagirathi in Gurhwal, is 1,514 m. to the mouth of the Hoogly, or 1,557 to the mouth of the Meghna. Of the vast number of channels which form its delta only the Meghna and its branch the Chundna are navigable by large craft at all seasons to the main stream. The waters of the Ganges generally rise from the end of May to September, when the lower parts of Bengal, for a width of 100 m., are completely inundated. The rise at Calcutta is about 7 feet, and at Benares and Allahabad 80 or 45. The general width of the river, according to Capt. Prinsep, is "very unequal, but may be reckoned to average a mile in the dry season on its whole course through the plains, and two miles in the freshes." The average discharge of water, according to Rennell, is in the dry season 80,000 cubic feet per second, and in the wet season 405,000 cubic feet. The Ganges brings down great quantities of earthy matter, and its course at intervals is obstructed by extensive shoals. Large tracts of land are sometimes swept away by the current in a single season, and remarkable changes are thus frequently made in the channel. The Ganges is universally regarded by the Hindoos as a sacred stream, and its waters are carried great distances to be employed in ceremonial ablutions; they are also used to swear by in courts of justice. There are particular places, however, which are held more holy than the rest, and these are resorted to by great numbers of pilgrims. The country watered by this river is one of the finest in the world, abounding in every kind of vegetable product suited to that region, and adorned with beautiful scenery. The principal cities and towns on its banks are Furruckabad, Cawnpore, Allahabad, Benares,



Ghazeepeer, Patna, Bahar, and Moorshedabad. Calcutta and Hoogly are on the Hoogly.—The Ganges canal, designed both for the irrigation of the Doab and for purposes of navigation, now in course of construction, will be when completed one of the grandest works of the kind in the world. The main line extends from Hurdwar to Allyghur, where it branches, one division leading to Cawnpore and the other to Humeerpoor, and 3 lesser channels diverge to Futteghur, Coel, and Bolundshahur. The whole work when completed will be 810 m. long, 525 m. of which were opened in 1854.

GANGLION, in anatomy, a small rounded or elongated nervous mass, of a reddish gray color, situated in the course of the nerves. There are 2 kinds of nervous ganglia, one forming part of the cranial system of nerves, the other part of the sympathetic system; the first kind are situated near the origins of many of the cranial and of all the vertebral nerves, and on the posterior or sensory root of the latter; the second are generally placed along the sides of the anterior surface of the spinal column, from the head to the coccyx, the 2 great semilunar and cardiac ganglia coming near the median line. They are composed of 2 substances, one white like the medullary substance of the brain, the other reddish gray, somewhat resembling the cerebral cortical substance; the internal medullary filaments are the continuation of the nerve upon which the ganglion is situated. The nervous system of ganglia is considered by some as a series of more or less independent centres, giving off nerves to the organs of nutrition or communicating branches to the cerebro-spinal system; according to others, these ganglia and their associated nerves form a special system with numerous ramifications, the sympathetic system presiding over the involuntary contractions of the heart and digestive apparatus, and all the processes concerned in secretion, nutrition, and exhalation, and in disease conveying different sympathetic phenomena from one part of the organism to another. Strictly speaking, all the nervous centres in the highest vertebrates may be called ganglia; even the hemispheres of the human brain may properly be styled cerebral ganglia. The principal ganglia of the head are the ophthalmic, which sends branches to the iris and the vascular apparatus of the eyeball; the otic, intimately connected with the organ of hearing; Meckel's or the sphenopalatine, ministering to the senses of smell and taste; the submaxillary, whose branches proceed almost entirely to the gland of that name; the Gasserian, of the 5th pair of nerves; and those near the roots of the pneumogastric and glossopharyngeal. In the neck are the superior, middle, and inferior ganglia of the sympathetic, and the origins of the cardiac plexus which supplies the heart; in the chest, the 12 thoracic ganglia on each side, from which originate the splanchnic nerves which go to form the semilunar ganglia or solar plexus; in the abdomen, the latter sends

branches which accompany all the divisions of the aorta; there are beside these the lumbar and sacral ganglia on each side of the spine, distributing their branches to the organs in the pelvis. The so called lymphatic ganglia are glandular, and not nervous masses. In the invertebrata ganglia are the highest forms of nervous centres, and occur either isolated or connected together by single or double longitudinal cords; they perform the functions both of the cerebral and spinal centres of the higher animals.—In surgery, a ganglion is a small indolent fluctuating tumor, developed in the course of the tendons, containing a semi-fluid secretion inclosed in a cyst generally communicating with the tendinous sheath. It is a dropsey of the synovial sheath, caused by friction, some wrench or tension of the tendon, or the sequence of some rheumatic or gouty disease; the light of a candle may be seen through it. The most common situation is about the wrist and fingers, though it may occur in the course of any tendon. When there is no inflammation, the best treatment is to puncture the tumor by the subcutaneous method, in order that the contained fluid may escape into the surrounding areolar tissue and be absorbed; pressure and cold applications should then be applied. If this fail, stimulating liniments and even blisters may be tried, to induce absorption. When unconnected with a tendinous sheath, the tumor may be dissected out, punctured like an abscess, or transixed with a seton; the subsequent thickness may be removed by the vapor or steam bath and douche; any rheumatic taint requires to be corrected by appropriate remedies. A popular way of treating these tumors is to rupture them by a strong and sudden blow; those on the back of the wrist and hand may thus be scattered without danger.

GANGRENE, the loss of life in any of the soft parts of the body, without extinction of the vital powers in the rest of the organism. The term *ephacelus* has been applied to the condition in which gangrene may terminate, the utter and irrecoverable death of a part, while in some stages of gangrene the circulation may not be completely arrested, the sensibility of the nerves not entirely gone, and recovery of the local loss of action not impossible. The death of the bony tissue is called *necrosis*. When gangrene is the consequence of violent inflammation or of the obstructed return of venous blood, the affected parts are gorged with fluid, constituting humid gangrene; while dry gangrene generally arises from a deficient supply of arterial blood or from constitutional causes, accompanied by very slight or by no inflammation, the mortified part becoming dry and hard; the gangrenous portion in the former case is called a slough, in the latter an eschar. The local predisposing causes are congestion and deficient circulation; the constitutional are weakness from disease, old age, or misery. The exciting causes are mechanical and chemical injuries, especially gun-shot, lacer-

sted, and poisoned wounds; insufficient supply of arterial or obstructed return of venous blood, as in the gangrene from ossified arteries in the first case and that from heart disease and varicose veins in the second; and injury or division of nerves. The areolar tissue is most subject to gangrene; after this come tendons and ligaments, denuded bone, the skin, and the muscles, in the order of enumeration. Gangrene spreads slowly or rapidly, according to the accompanying inflammation or the energy of the vital processes. When inflammation is about to end in gangrene, the redness becomes livid, with diminution of pain and sensibility, though the swelling may be increased; the parts become soft and cold, and emit an odor of decomposition; the livid color, when the disease is spreading, is gradually lost in the surrounding skin, but when the dead portion is to be cast off, a bright red line separates the healthy from the gangrenous tissue, called the "line of demarcation;" in a healthy person there may be high accompanying fever, but in a debilitated constitution the symptoms will be those of prostration and typhoid. The indications of treatment are to diminish the inflammation by general and local depletion; to support the strength by tonics and stimulants, when the gangrene is extensive or the system debilitated; to quiet restlessness and nervous irritability by opium; and to facilitate the separation of the dead parts by warm and stimulating applications, and by incisions to permit the free escape of fluids whose absorption might propagate the disease to internal vital organs. Amputation of a limb is sometimes the only way of arresting the spread of gangrene. Surgery often has occasion to produce gangrene as a remedial measure, in the removal of tumors and diseased growths; hemorrhoidal swellings, nasal and uterine polypi, erectile tumors, cancerous growths, &c., are effectually and safely removed by cutting off their supply of blood by ligature of the principal vessels. Gangrene is always a dangerous symptom, especially in very young or very old persons, and in weakened constitutions; and when terminating favorably, it may leave behind it tedious suppurations, fistulous ulcers, and various deformities. Hospital gangrene, or sloughing phagedæna, a putrid disease caused by crowding sick and wounded men into ill-ventilated and dirty rooms, is one of the most terrible accompaniments of war, often destroying more than the bullet and the sword; and the army surgeon generally finds his best directed efforts set at defiance by the force of surrounding and insurmountable obstacles; the principles of treatment are the same as in ordinary gangrene.

**GANGUE** (Germ. *Gang*, a vein), the matrix or veinstone of ores. These are always included in some stony matter, which forms the principal portion of the veins or beds which are worked for the sake of their metalliferous contents. Quartz is the most common veinstone, and has been called the mother of ores. Calca-

reous spar is also a frequent predominant material of veins. Sulphate of barytes or heavy spar, and fluor spar, are also often found as gangues.

**GANJAM**, a district of the Madras presidency, British India, bounded N. and N. W. by Orissa, S. E. by the bay of Bengal, and S. W. by the district of Vizagapatam; area, 5,728 sq. m.; pop. 926,930. The coast is bold, rocky, and destitute of large harbors, though coasting vessels can anchor within the mouths of some of the rivers. The most important streams are the Chicacole, Callingapatam, and Rasikoila, all of which are dry during part of the year. A range of hills runs through the district from S. W. to N. E., in many places approaching close to the shore, in others receding a few miles, and in the N. part leaving between it and the coast a wide sandy plain, in which, partly in this district, but mostly in Orissa, lies the lake of Chilka, 42 m. long, 15 m. broad, and only 6 feet deep. The climate, during the hot and part of the rainy season, is unhealthy. The soil in general is productive, and the staples are rice, maize, sugar cane, millet, pulse, oil seeds, wax, lac, guma, dye stuffs, arrow root, and a little cotton for domestic use. Valuable ornamental woods are found. The only manufactures are coarse cottons and muslins, which have greatly declined since the general introduction of European fabrics. Ganjam is one of the 5 districts formerly called the Northern Circars, of which the French obtained possession in 1758, and passed into British hands only after a violent contest between the British and French, which was decided by Olive in 1759. The principal towns are Ganjam, Chicacole, Russelkondah, and Guntoor, the last of which acquired some notoriety about 1840-'45, in connection with the Meriah sacrifices practised by the Khoonds of the frontier. Young human victims, in great numbers, were immolated to propitiate a divinity presiding over the fertility of the earth, and so wedded were this barbarous tribe to their horrible rites that the sacrifices were only abolished by vigorous military operations.

**GANNAL**, JEAN NICOLAS, a French chemist, born in Saar-Louis, July 28, 1791, died in Paris, Jan. 1852. After being employed at a drug shop, he was in 1808 attached as an apothecary to the medical department of the French army. In 1816 he became the chemical assistant of Thénard in his lectures at the Sorbonne. Industrial pursuits and useful inventions afterward engaged his attention, in which he was very successful. He invented a new kind of chimney, the first elastic rollers for the printing press, the refining of borax, a new method for melting and hardening tallow employed in making candles, &c. In 1827 he received the Montyon prize from the institute for his system of chloric inhalation for catarrh. He is best known, however, by his process for embalming bodies, the first public experiments in which were made in 1838, and for which he received the same

prize. It consists in injecting a solution of sulphate of aluminum into the carotid artery.

GANNET, a web-footed bird, of the family *Sulidae* and genus *Sula* (Briss.). The genus is characterized by a bill longer than the head, strong, straight, and broad at the base; the sides compressed and grooved toward the tip, which is slightly curved, with the lateral margins obliquely and unequally serrated; the nostrils basal, linear, in a lateral groove, and almost invisible; the wings long and pointed, the 1st and 2d quills longest; the tail long and graduated; the tarsi short and stout, rounded in front and keeled behind; the toes long, all 4 connected by a full membrane; the claws moderate and rather flat, the middle one serrated, and the hind one rudimentary; beneath the lower mandible is a naked sac, capable of moderate distention. There are about 10 species described, in various parts of the world, of which 2 are natives of the western hemisphere, the booby (*S. fiber*, Linn.), treated under its own title, and the gannet, or solan goose (*S. bassana*, Briss.). The gannets are usually found in immense numbers on desert and rocky islands near the mainland, migrating southward in small parties on the approach of cold weather; they sometimes float lightly on the sea, but are generally seen on the wing; their flight is powerful, rapid, buoyant, and long sustained; their food consists of fishes which swim near the surface, upon which they dart headlong from a considerable height, making a great splash, and sometimes remaining under water a minute or two; they swallow the fish head foremost, and their gullet is so expansible as to take in the largest herring. The common gannet (*S. bassana*, Briss.) has a close dense plumage, of a general whitish color, buff yellow on the head and hind neck, and primaries brownish black; the bill is pale bluish gray; bare space about the eye and on the neck blackish blue; iris white. The length to end of tail is 40 inches, to end of wings 38, the extent of wings about 6 feet, and the bill 4 inches; the weight is 7 lbs. The female is like the male, but smaller. The young are brown and white above, and grayish white below. This species breeds in great numbers on the rocky islands near the coast of Labrador, and after the breeding season, in May and June, is found all along the Atlantic states to the gulf of Mexico; it is entirely maritime, and never seen inland unless forced in by violent gales. The flight, when travelling, is low, performed by 30 or 40 flaps of the wings, and then by sailing for an equal distance with extended neck; the walk is exceedingly slow and awkward. The nest is a hole in the earth surrounded by weeds and sticks matted together for a height of 10 to 20 inches, and only a single pure white egg, about 8 inches long, is laid in it; the young are hatched in about a month; the males assist in incubation. They congregate on the same rock in vast numbers, and are quarrelsome during incubation, being fond of stealing from each other the materials for the nests, which are sometimes brought a distance of 30

miles. A young gannet, with its large head, closed eyes, thin neck, small wings, large abdomen, naked skin, and bluish black color, is a most uncouth and disagreeable object. When shot at or wounded, gannets disgorge their food like vultures. They have very few enemies among birds or beasts; the eggs and young are sometimes devoured by the larger gulls. According to Audubon, the feathers on the lower parts are very convex externally, giving the appearance of light shell work.

GANNETT, EZRA STILES, D.D., an American clergyman, born in Cambridge, Mass., May 4, 1801. He studied at Phillips academy, Andover, entered Harvard college in 1816, and was graduated in 1820; studied the three following years in the divinity school at Cambridge; received ordination as colleague with William Ellery Channing, June 30, 1824; and, with the interruption of 2 years' absence in Europe on account of ill health, he has continued pastor of the Federal street church in Boston for more than a third of a century. Beside publishing many occasional discourses at the request of his audience, and editing the "Monthly Miscellany" from 1844 to 1849, he was associated with Dr. A. Lamson in the care of the "Christian Examiner," the principal periodical of the Unitarian denomination in the United States. Dr. Gannett has been among the foremost in the religious and benevolent enterprises of his denomination, in which he holds an eminent rank for his devotion to pastoral duty, his fervid eloquence, and his conservative theological tendencies.

GANOIDS (Gr. *γανος*, splendor), in Müller's classification, an order of fishes having either enamelled scales, bony plates, or a naked skin; fins generally, but not always, covered anteriorly by spiny plates (*fulcra*); the internal skeleton sometimes osseous, as in the gar pike, or partly cartilaginous, as in the sturgeons; the vertebral column occasionally extending to the end of the upper caudal lobe; nasal apertures double; gills free and lying in an operculated cavity, with or without an opercular gill, a pseudo-branchia, and blowing holes; the arterial trunk always with numerous valves; no decussation of the optic nerves, and the ventral fins abdominal; there is always an air bladder, and a duct communicating with the oesophagus; the eggs are conveyed from the abdominal cavity by tubes; like the shark family, they have a thymus gland, and often a spiral valvular fold in the intestine. Müller divides the ganoids into 4 families: 1, containing the American gar fish; 2, the *polypterus* of Africa; 3, the *amia*, or mud fish of America; and 4, the sturgeons. These will be described under the 1st, 3d, and 4th titles respectively. Prof. Agassiz is inclined to elevate the ganoids from an order to a class, separate from ordinary bony fishes and superior to them in organization, though inferior to the selachians (sharks and rays); he makes them the 8d class of the branch vertebrata, with the 8 orders of coelacanthas, acipenseroids (sturgeons), and sau-

roids (gar fish), with 8 additional doubtful orders of siluroids, plectognaths (*balistes*, *ostracion*, and porcupine fishes), and lophobranchs (*hippocampus*, pipe fish, and *pegarus*).—The remainder of this article will be devoted to the consideration of fossil ganoids, and to the interesting questions connected with their structure and geological distribution. Ganoid fossil scales, whether angular, rhomboidal, or many-sided, are imbricated like the slates of a roof, and formed of an outer plate of enamel, an inner porcelain layer, and an intermediate reticulated structure analogous to the diploë between the tables of the human skull. The fin rays of the ganoids are bare enamelled bones, each consisting of a plate of enamel on each side and a lamina of bone between them; the necessary flexibility of such rays is secured by joints which extend through the rigid enamel, leaving the central bony plate undivided, on the principle of the half-sawed moulding which the carpenter wishes to bend at an angle or around some curved surface. The dermal or external skeleton of the ganoids is so remarkably developed, that in many instances it has served to determine the forms of genera and species in the old red sandstone and carboniferous strata, every other portion having perished, as their internal skeletons were either very slight or entirely cartilaginous; enamelled plates represent the head, enamelled imbricated scales indicate the form and proportions of the body, and enamelled rays show the position and outline of the fins. The instances of great development of the outer skeleton in higher animals are few, being limited principally to the armadillo and pangolin among mammals, the tortoises and crocodiles among reptiles, and the gar pikes and sturgeons among fishes. The earliest fishes, those of the silurian epoch, seem to have been all placoids; in the following age, that of the old red sandstone, the ganoids appeared in great numbers, and with the placoids formed the entire class of fishes for unknown millions of years, that is, through the old red sandstone, carboniferous, permian, triassic, and oolitic periods, down to the cretaceous epoch, when ordinary bony fishes were brought into existence—the age of these 2 orders corresponding nearly to the reign of the ferns, palms, coniferous trees, and their allies among plants. When the bony fishes became the prevailing type, the other orders diminished in proportion, so that at the present time the gar pikes and the sturgeons are the chief representatives of the old powerful and numerous ganoids. In the human family we see similar instances of nations reaching their culminating point, and then disappearing or lapsing into barbarism; the Aztecs of Central America and the Copts of Egypt are the remnants of the great races which built the mounds of the Mississippi valley and the Egyptian temples and pyramids. In the words of Hugh Miller: "But in the rivers of these very countries, in the *polypterus* of the Nile, or the *lepidosteus* of the Mississippi, we are presented with the few surviving fragments

of a dynasty compared with which that of Egypt or Central America occupied but an exceedingly small portion of either space or time. The dynasty of the ganoids was at one time coextensive with every river, lake, and sea, and endured during the unreckoned eons which extended from the times of the lower old red sandstone until those of the chalk." Among ganoids are found some of the strangest ichthyic forms, presenting a structure and placoid affinities no longer seen in nature; these gigantic and strange fishes were of the first rank in their class, and, being then the only existing representatives of the vertebrates, exhibited characters belonging to the higher class of reptiles, of which they were the prophetic types. These reptilian fishes attained their greatest number and largest size during the carboniferous period, and were remarkable both for their formidable offensive weapons, and their strong defensive armor. This remote age was as fully characterized by bloodshed and destruction of animal life as any since the creation of man; indeed no animal ever had more powerful teeth than the ganoid *rhisodus* of the coal fields, sharper and 4 times as large as the hugest living crocodile can boast of; the dorsal and caudal spines of some of the contemporary placoids far exceeded in size and destructive properties those of any living shark or ray; where such weapons were employed, defensive armor to resist them was kindly bestowed by the Creator—hence the enamelled scales of the ganoids. The ganoid teeth and scales bore the same relation to each other that the heavy maces, battle axes, and two-handed swords did to the steel armor of the days of chivalry; the sharp teeth of modern carnivorous fishes are suited for the soft and generally defenceless bodies of the ctenoids and cycloids, as the keen scymitar and slender rapier are best suited for the defensive coverings of modern warfare. In the lepidoid or acanth family, confined chiefly to the old red sandstone and carboniferous strata, the teeth are small, brush-like, and in several rows, or obtuse and in a single row; the scales are flat, rhomboidal, parallel to and wholly covering the body; all those occurring in strata earlier than the jurassic have the tail heterocercal or with the spine prolonged into its upper lobe; it has no representative among living fishes. Among the most interesting genera are *dipterus*, in which *D. macrolepidotus* of the old red sandstone resembles a fish carved in ivory, crusted with enamel, and thickly dotted with minute puncturings; with circular scales, thickly enamelled fin rays, strong angular pectorals, scale-protected ventrals like the hind fins of the *ichthyosaurus*, and a long dorsal and anal, the former consisting of 2 portions. *Osteolepis*, also British devonian, has 2 anals alternating with 2 dorsals, large and rounded pectorals, small ventrals, large mouth, and scales of moderate size. Among the genera most numerous in the coal measures are *paleoniscus*, a small, handsome, and well-proportioned fish, with moderate-sized fins and scales, a sin-

gle dorsal opposite the space between the ventrals and anal, and all with small rays at their margins—about 80 species in North America and northern and central Europe; *eurynotus*, a flattened and bream-shaped species, with large dorsal, ventrals, pectorals, and head; and *anthodes*, with lengthened body, very small scales, dorsal opposite anal, no ventrals, large pectorals, and very wide mouth, in proportions resembling the conger eel or ling. Among those most numerous in the jurassic age are *tetragonolepis*, with a broad flattened body, rapidly decreasing to the tail, rounded head, moderate fins, and pointed teeth—about 20 species in Europe; *lepidotus*, with body shaped like a carp's, large rhomboidal scales, and caudal fin almost square—about 80 species; and *pholidophorus*, resembling the herring, but with rhomboidal scales, homocercal or equal-lobed tail, and small teeth—more than 80 species.—In the family of cephalaspids, which contains the extreme acanth forms for a long time not recognized as fishes by palæontologists, the body and head are covered with a few non-imbricated plates or shields; the heterocercal tail, covered with imbricated scales, has no true caudal fin; and in place of pectorals are 2 long bony appendages or stiletts; the dorsal cord like that of the sturgeons; they belong to the old red sandstone formation, and were short-lived in comparison with some other ganoids. The genus *pterichthys* (winged fish), discovered by Hugh Miller in the Cromarty sandstone, first appears at the base of the old red sandstone, and disappears with its upper beds; one of the most recent species, *P. major*, is the largest; it is as strange a form among fishes as the *plesiosaurus* and *pterodactyle* among reptiles; in his work on "Fossil Fishes," Prof. Agassiz says: "It is impossible to find any thing more eccentric in the whole creation than this genus." Hugh Miller describes it, when seen from the under surface, as resembling the "human figure, with the arms expanded as in the act of swimming, and the legs transformed, as in the ordinary figures of the mermaid, into a tapering tail." There is no separation between the head and trunk, and the whole animal is in a complete armor of solid bone; the strong helmet of the head is perforated in front by 2 circular holes for the eyes, the body above and below protected by a curiously plated cuirass, and the tail sheathed in a flexible mail of bony scales; the plate-covered arms are articulated by a complicated joint to the lower part of the head; the flat abdomen and ribbed and groined arch of the back add to the strength of the armature without increasing the weight—the creature resembling a "subaqueous boat, mounted on two oars and a scull;" and this strange fish is a characteristic organism of the old red sandstone. The genus *coccosteus* has not the pectoral appendages of the preceding animal, and the head and anterior part only of the trunk are covered with a bony helmet and cuirass, the caudal portion being naked; it has one dorsal

and one anal fin; the mouth is furnished with small, equal, conical teeth. The most remarkable peculiarity in this fish, unique among vertebrated animals as far as known, is that the jaws possessed both the usual vertical motion, and also a horizontal movement as in crustaceans, indicated by the 2 sets of teeth, one on the upper edge of the jaw and the other on the line of the symphysis, the latter of which, if brought into action at all, could only be so by the lateral movement of the jaws. The jaws of *coccosteus* are also interesting, as presenting the most ancient internal bone which has displayed its structure under the microscope. The jaw of this ancient fish shows the Haversian canals, the lacunæ and osseous cells, as in the bones of man at the present time; showing the extension of the great creative plan through the most distant ages, and by a fair inference to the beginning of vertebrate existence. The genus *cephalaspis*, or buckler-head, had a thin triangular body, and crescent-shaped head covered with a singular shield-like plate, with lateral prolongations extending along the sides; body covered by vertical rows of scales; no ventrals nor pectorals, and 2 dorsals. It lived at the same time with large placoids, armed with dorsal spines (of which the spines only remain), and with a gigantic lobster-like crustacean more than 4 feet long; it belongs to the middle portion of the old red sandstone.—The family of saurroids, of which the gar pike is one of the few living representatives, had pointed conical teeth alternating with small brush-like ones; the skeleton bony; the scales flat, rhomboidal, and completely covering the body; those living before the jurassic age had unequal-lobed tails, while the homocercal genera flourished at a more recent period. The genus *megalichthys* was a formidable fish of large size; the scales of the body and the plates of the head had such a brilliant enamelled surface, "that they may still be occasionally seen in the shale of a coal pit, catching the rays of the sun, and reflecting them across the landscape, as is often done by bits of highly glazed earthenware or glass." The genus *diplopterus* was of smaller size, with an elongated tapering body, flat head, rounded muzzle, 2 dorsals, 2 anals, and the caudal fin truncated almost vertically, the lobes coming off laterally from a prolongation of the vertebral column; their scales were of great brilliancy, and must have flashed brightly through the woods of the coal period, as they leaped into the air in sport or in pursuit of prey. The genus *pygopterus* had the fins greatly developed, and a heterocercal tail; *aspidorhynchus* had a much elongated body, homocercal tail, the upper jaw prolonged into a beak and extending beyond the lower, the scales large; the former belongs to the coal and magnesian limestone formations, and the latter to the jurassic.—The coelacanth family is characterized by having all the fin rays and bones hollow, a peculiarity not found in other ganoids; and all the fin rays are stiff, articulated only at their bases, and sup-

ported on interapophyseal small bones; they occur in all the ages from the lower devonian to the chalk formations, most numerous in the red sandstone and coal strata. In the genus *asterolepis*, one of the earliest as well as one of the largest of the ganoids, the bony plates which covered the head are ornamented with star-like markings, and the scales of the body are delicately carved; Hugh Miller says its cranial bucklers have been found in the flag stones of Caithness, "large enough to cover the front skull of an elephant, and strong enough to have sent back a musket bullet as if from a strong wall." It must have equalled in size the largest alligator, and its teeth throughout the jaw had the reptilian peculiarity of being received into deep pits opposite, causing them when the mouth is shut to lock like the serrations of a bear trap. The genus *holoptychius* was of very large size, with rough scales several inches in diameter, the cranial bones sculptured like those of the crocodile, and conical teeth larger than those of any living reptile. The *H. (rhieodus) Hibberti*, the largest of about 20 described species, was of such a giant size that the words applied in Job to leviathan might appropriately be given to it; this reptilian fish must have been 40 feet in length, with teeth 8 times larger than those of the largest crocodile, and covered with an impenetrable coat of mail. There were several smaller holoptychians in the red sandstone, even more strongly armed than this giant of the coal period.—For further details on fossil ganoids of these and other families, the reader is referred to the great work of Prof. Agassiz on "Fossil Fishes;" and for a popular description of the most interesting genera to the charming writings of Hugh Miller, especially the "Testimony of the Rocks," "Footprints of the Creator," "Old Red Sandstone," and "Popular Geology."

GANS, EDUARD, a German jurist, born of Jewish parents in Berlin, March 22, 1798, died there, May 5, 1889. He studied successively in the universities of Berlin, Göttingen, and Heidelberg, and became early associated with Hegel, whose philosophical opinions he shared, and by whose influence he conceived a strong antipathy to the historical school of jurisprudence, then supported by the great names of Savigny and Hugo. He became doctor of law in 1820, resided for several years in Paris and London, and in 1836 was appointed professor of law in the university of Berlin. He soon published a work on the "Law of Inheritance in its Historical Development," in which he attacked the historical school, and aimed to treat the science of law according to the principles of the Hegelian philosophy. His clear and vivacious manner of lecturing was strikingly in contrast with the monotonous gravity usual in German universities, and gained for him crowded audiences. He began a course in 1835 upon the history of the last 50 years, but was obliged by the government to suspend it. He was one of the founders in 1836 of the *Berliner Jahrbücher*, and has left many works on juridical, historical, political, and

æsthetic subjects. He was among the most active of those who prepared the posthumous edition of the complete works of Hegel, and the "Philosophy of History" was really the work of Gans, since Hegel left only its introduction.

GANSEVOORT, PETER, an American officer, born in Albany, July 17, 1749, died July 2, 1812. In 1775 he received the appointment of major in the 2d New York regiment, and joined the army which under Montgomery invaded Canada. In March, 1776, he was made a lieutenant-colonel, and at a later period of the same year he was appointed to the command of Fort George. In 1777 he was placed in command of Fort Stanwix, which he gallantly defended against a vigorous siege of 20 days by British and Indians under St. Leger, and received the thanks of congress for having thereby prevented the coöperation of that general with Burgoyne, and contributed to the defeat of the latter. In 1781 the state of New York raised him to the rank of brigadier-general, which he held till the termination of the war. He afterward filled various important offices under the federal government. He was successively commissioner of Indian affairs, commissioner for fortifying the frontiers, and military agent. In 1809 he was appointed brigadier-general in the U. S. army.

GANYMEDE, a Trojan prince, son of Tros and brother of Ilus, was the most beautiful of mortals, and was carried off, according to the legend, by the eagle of Jupiter, to succeed Hebe as cup-bearer to the gods on Olympus. Astronomers have placed him among the constellations under the name of Aquarius, or the water-bearer. He is represented in the fine group of statuary in the Pio-Clementine museum at Rome, and in the group of "Hebe and Gany-mede" by Crawford, at Boston.

GAR FISH, or GAR PIKE (*lepidosteus*), a ganoid fish, belonging to the same order as the *polypterus* of Africa, the mud fish (*amia*) of America, and the sturgeon family; it is the only genus of its family, and there are more than 20 species, all American. As in other ganoids, the body is covered with smooth enamelled scales, of a rhombic form, arranged in oblique rows, and so hard that it is impossible to pierce them with a spear; this enamel is like that of teeth, and the scales contain the fluorine and lacunæ of ordinary bone structure. The internal skeleton is bony; the snout is elongated, varying in width according to the species; both jaws and nasal bone are covered with small teeth, with long and pointed ones along the edge; the teeth are in double rows of unequal size, the larger resembling those of reptiles, and the smaller fish-like, the front ones of the lower jaw being received into sheath-like cavities in the upper, as in the alligators; their structure resembles that of the labyrinthodont reptiles, having processes of the pulp cavity radiating toward the circumference; the vertebræ also present a reptilian arrangement in having ball and socket articulations, the anterior surface of each bone being convex and the posterior concave; this

gives greater flexibility to the spine, and enables this genus (alone among fishes) to move the head independently of the trunk, and also to retain the posterior part of the body in a curved position. The gills on the 4 arches have a perfect bifoliate structure, and behind the last and the hyoid bone there is the usual fissure; there is a respiratory opercular gill as well as a pseudobranchia, but no blow-hole; branchiostegal rays 3, the membrane passing from side to side, undivided. The anterior edge of all the fins is protected by hard spiny scales, and all the fin rays are articulated; the dorsal and anal fins are far back, and nearly opposite one another; the caudal fin is abruptly truncated, and its rays are inserted partly at the end of and partly beneath the extremity of the spine. There are the usual numerous valves in the arterial bulb, no decussation of the optic nerves, and abdominal ventral fins; the stomach is continued without cæca to a slender twice-folded intestine, which has a slightly developed spiral valve, but numerous pancreatic cæca; the long air or swim bladder is muscular, freely supplied with blood from the aorta, divided into cells like the lung of a reptile by muscular bundles, and opening into the throat by a wide duct and long slit guarded by a sphincter muscle; the ovaries are saciform, with oviducts issuing from their middle. Gar fish are not uncommon in the western rivers and northern lakes communicating with the gulf of Mexico and the St. Lawrence, and probably every separate basin and watershed has its peculiar species; Prof. Agassiz has determined 10, 5 pointed-nosed and 5 short-nosed. They frequent shallow, reedy, or grassy places, basking in the sun like the pike, and devouring living prey with great voracity. The manner of seizing prey differs from that usually observed in fishes, and resembles that of reptiles; instead of taking their food at once with open mouth and swallowing it immediately, they approach it sily and sideways, and then, suddenly seizing the fish or other animal, hold it until by a series of movements it is placed in a proper position for being swallowed, in the manner of alligators and lizards; the ball of food is also seen to distend the body as it passes downward, as in snakes. This reptilian fish, like the ichthyoid reptiles, is in the habit of approaching the surface of the water, and of apparently swallowing air; at any rate, a large amount of air escapes from the mouth, most of which had probably been previously swallowed, and a part of which may have been secreted by the lung-like air bladder. As in the *menobranchus* and other fish-like salamanders, this air bladder doubtless performs certain respiratory functions, and perhaps more than in the naked-skinned reptiles; at any rate gar pikes live longer out of water than fishes generally, and to a degree not explicable by any arrangement of the gills. The gar pike and the African *polypterus* (described below) are the only two existing genera of a type of sauroid fishes which were very numerous in the secondary geological epoch, extend-

ing also in diminished numbers through the palæozoic age at a time when reptiles proper did not exist; they are found from the lower silurian strata to the present time, gradually diminishing through the tertiary to the 2 existing genera; they present one of the first steps in the geological succession of bony fishes, at a time when the ctenoids and cycloids had not appeared; after the rhizodont reptiles and the common osseous fishes were created, the ganoids (which Agassiz is disposed to elevate into a class) began to diminish.—The common gar fish (*L. osseus*, Linn.), called also bony pike and Buffalo fish, attains a length of 5 feet. The color is umber brown on the back and head, the sides yellow, and the belly white; there are circular black spots on the caudal, dorsal, and anal fins. It is found in Lakes Erie, Huron, and Champlain, the Ohio and its tributaries, and other western rivers. The great length of its jaws will distinguish it from other species; it is often seen apparently sleeping on the surface, and gently carried round in an eddy for an hour at a time; it leaps often out of water in pursuit of its prey, and is so swift and strong a swimmer as to stem the most furious rapids. The alligator gar fish (*L. ferox*, Raf.) has a shorter head, the jaws forming not quite half the length, broad and flat above; the skin is rough, the scales imbricated and sculptured; teeth numerous, strong, and prominent; the upper jaw, as in the preceding species, expanding into a knob at the end; the color is yellowish brown. It inhabits the Mississippi and Ohio rivers and their tributaries, and is usually from 4 to 6 feet long; according to Rafinesque, it attains a length of 12 feet, and is a match for an alligator; its impervious coat of mail, strong teeth, size, strength, and agility must make it a very formidable fish, though probably not superior to the equally well armed and powerful alligator. It may be well called the shark of fresh water, though not belonging to the placoid group of fishes. A smaller, less common, and flat-headed species is the duck-bill gar (*L. platostomus*, Raf.), found in the western waters; the jaws are shorter, wider, and flatter than in the common gar, and longer and more tapering than in the alligator gar; the head and back are dusky and umber, sides yellowish, abdomen white, iris golden yellow, the dorsal, anal, and caudal fins spotted; a series of obscure circular spots on the median line behind the anal. The length is from 2 to 5 feet. There are several other species described, more or less resembling the above; but these will serve to give an idea of the general characters of this singular fish, the living type of the dominant family of its class during the carboniferous period.—The allied genus *polypterus* (Geoffr.), from the Nile, Senegal, and other African rivers, is characterized by similar enamelled scales, and by a number of finlets extending from the middle of the body to the tail; the throat is covered with hard, nearly immovable plates, which would greatly embarrass respiration were it not for 2 openings

on the top of the head, which answer the purpose of blow-holes and allow the water to pass through them; the lobes of the tail are of unequal size; the abdominal organs occupy a very small space, being packed close to the spine; the upper jaw is not in several pieces, but the mandibles and skull are as in osseous fishes generally; there is no opercular gill, nor pseudobranchia; the nostrils are very complicated, with labyrinthine gill-like folds; the stomach is caecal, the intestine provided with a well-marked spiral valve, and there is a single pancreatic caecum; the air bladder is double, communicating with the throat by a duct opening on the ventral side, and its arteries are formed by the union of the blood vessels coming from the last gill, carrying therefore oxygenated blood.—The *lepidosteus* is by far the best known and most interesting of the sauroid fishes, and has been of such value to palaeontologists that it has been well said by Hugh Miller, in his "Lectures on Geology," that "it would almost seem as if the *lepidosteus* had been spared, amid the wreck of genera and species, to serve us as a key by which to unlock the marvels of the ichthyology of those remote periods of geologic history appropriated to the dynasty of the fish." (For further details on the fossil members of the family, see GANOIDS.)

GARAT, DOMINIQUE JOSEPH, a French writer and politician, born in Ustaritz, Basses-Pyrénées, Sept. 8, 1749, died near that place, Dec. 9, 1838. He was a contributor to the *Encyclopédie méthodique* and the *Mercur de France*. He published an eulogy on L'Hôpital in 1778; was elected to the constituent assembly in 1789; reported the sittings of the assembly in the *Journal de Paris*; succeeded Danton as minister of justice, and informed Louis XVI. of the judgment of the convention. From the ministry of justice he was transferred to the home department. He coöperated with the enemies of the Girondists, tried in vain to save some of the latter, and left office in Aug. 1794. Under the directory, he was sent as ambassador to Naples, where he was ill received. In 1805 he received a mission to Holland. On the downfall of Napoleon he tried every means of propitiating the Bourbons, but in 1816 was excluded from his seat in the institute. He now wrote one of his most interesting books, *Mémoires historiques sur la vie de M. Suard*, and not long afterward retired to his native mountains, where he led an obscure life, devoting his time to religious exercises.

GARAY, JÁNOS, a Hungarian poet, born at Szekszárd, in the county of Tolna, in 1812, died at Pesth, Nov. 5, 1858. His chief productions are the epic poems "Csatár," "Sophia Bosnyák," "The Wife of Frangepán," and "St. Ladislav;" the dramas "Árbooz" and "Elizabeth Báthory;" "The Árpads," a collection of ballads on the history of that Hungarian dynasty; and *Balaton-i kanyók*. He wrote beside numerous other poems, sketches in prose, and contributions to literary periodicals. His historical ballads are particularly popular. His poems have been

collected by F. Ney (5 vols., Pesth, 1858). A selection of them has appeared in a German translation by Kertbeny (2d ed., Vienna, 1857).

GARCIA, DON ANTONIO GUTIERREZ, a Spanish dramatist, born in Olchichanas in July, 1813. He arrived in Madrid at the outbreak of the Carlist war, and was drafted into one of the regiments raised to quell the insurrection. Too poor to purchase a substitute, he was about to become a soldier when his tragedy *El trovador* was accepted at the theatre del Principe. The success of this work, which 20 years later furnished the libretto for one of Verdi's most popular operas, was complete, and the author was enabled to release himself from the conscription. He has since produced many other successful plays, among which are enumerated *El paje*, *El rey monje*, and *Magdalena*.

GARCIA, MANUEL DE POPULO VICENTE, a Spanish composer and singer, born in Seville, Jan. 21, 1775, died in Paris, June 9, 1832. Having acquired considerable celebrity as a tenor singer in Spain, he made his début in Paris in 1808, and for many years was a reigning favorite in all the great cities of Europe. He wrote a number of operas, of which the "Caliph of Bagdad" proved the most successful. In 1825 he came to the United States with an opera troupe consisting of himself, his wife, his daughter Maria Felicia, afterward celebrated as Madame Malibran, and several others. The enterprise proved so successful that Garcia extended his visit to Mexico. On the road between Mexico and Vera Cruz he was robbed of all his earnings, and returned to Paris in an impoverished condition. His voice having been impaired by age and fatigue, he established a school of vocal instruction, in which some of the greatest singers of Europe have been educated. He was equally accomplished as an actor and a vocalist.—His son MANUEL GARCIA, born in Madrid in 1805, and formerly a professor in the *conservatoire* at Paris, is one of the best teachers in Europe. He has written *Mémoire sur la voix humaine* (2d ed. 1847); *École de Garcia, traité complet de l'art du chant* (8d ed. 1851; remodelled in 1856 under the title of *Nouveau traité, &c.*); and *Observations physiologiques sur la voix humaine* (in French and English, 1855).—PAULINE VIARDOT, a distinguished singer, born in Paris, July 18, 1821, daughter of Manuel Garcia and sister of Madame Malibran, whom at the age of 4 she accompanied on their musical visit to America. Her precocity was then such that she could speak 4 languages, and 8 years later she had acquired so great a mastery of the pianoforte as to be deemed worthy of the instructions of Liszt. Subsequently her voice gave so much promise that it was determined to cultivate it for the stage. The death of her father in 1832, the frequent absences of her sister, and the absorbing duties of her brother, the professor of singing at the *conservatoire*, deprived her of the benefit of their instruction, and to the development of her vocal organ she was indebted to her mother, who had formerly been an accomplished singer.



By her 16th year her voice became fixed, resembling in its double register of contralto and soprano that of her sister, but more flexible, and comprising a compass of 3 octaves. In May, 1839, she made her début in London in Rossini's *Otello*, and subsequently in Paris, achieving a decided triumph in each instance. In the succeeding spring she was married to M. Viardot, a journalist of Paris. She sang there the next season with increased effect, reviving many recollections of her sister, and for 7 years appeared in Vienna, St. Petersburg, and Berlin, returning to London in 1848. Since that time she has confined herself chiefly to London and Paris; and in July, 1859, she accepted an engagement at the *théâtre lyrique* to make her début in *Orphée*. Her principal parts are Desdemona, Cenerentola, Rosina, Arsace, Norma, Lucia, Leonora, Donna Anna, Iphigenia, Valentine, and more particularly Fides in Meyerbeer's *Prophète*, a part which she may be said to have created, and in which she has never been surpassed. Her dramatic genius is of the first order, and her stage abstraction is so perfect that the actress is lost in the character she is personating. Her versatility is indicated by the wide range of characters she has assumed.

**GARCILASSO DE LA VEGA.** I. A Spanish lyric and pastoral poet, born at Toledo in 1503, died at Nice in Nov. 1586. His father, who was descended from an ancient family in the north of Spain, was councillor of state to Ferdinand and Isabella, and for some time their ambassador at Rome; his mother, the daughter and sole heir of Fernan Perez de Guzman, belonged to one of the most illustrious families of Spain. At an early age Garcilasso, who had been trained to arms, entered the service of the emperor Charles V. He was in the campaign in the Milanese in 1521, and distinguished himself by his valor at the battle of Pavia in 1525. In 1580 he married Donna Helena de Zuniga, an Aragonese lady; and in 1532 he was at Vienna, where he displayed his courage in battle with the Turks who had invaded Austria under the sultan Solymán. At Vienna, however, he incurred temporarily the displeasure of the empress by promoting the marriage of one of his nephews with a lady of the imperial household, and he was in consequence imprisoned on an island in the Danube, where he wrote a poem contrasting his own desolate situation with the beauty of the surrounding scenery. He was soon released and taken into greater favor than ever. In 1535 he accompanied the emperor on the expedition to Tunis, in which he was severely wounded in the head and arm. On his return to Spain by way of Sicily and Naples he wrote an elegy at the foot of Mount Etna. In the succeeding year he followed the emperor in the disastrous invasion of the south of France. The Spanish army on its retreat was greatly annoyed by the peasantry, 50 of whom posted themselves in a small castle on a hill near Fréjus. The emperor ordered the castle to be stormed. Garcilasso, who commanded a brigade of 80 companies headed

the assault sword in hand, and was the first to mount the wall. He had rashly neglected to wear his helmet, and in the moment of triumph was struck on the head by a stone and fell into the ditch beneath. He was carried to Nice, where he died 24 days afterward. The emperor cruelly avenged the death of his favorite by hanging all the brave defenders of the castle. Garcilasso left an only son, who fell in battle against the Dutch in 1569. Garcilasso's poems were found by the widow of his friend the poet Boscan among her husband's papers, and published with them. "Their character is singular," says Mr. Ticknor, in his "History of Spanish Literature," "considering the circumstances under which they were written; for instead of betraying any of the spirit that governed the main course of their author's adventurous life and brought him to an early grave, they are remarkable for their gentleness and melancholy, and their best portions are in a pastoral tone, breathing the very sweetness of the fabulous ages of Arcadia. They consist of 37 sonnets, 5 canzoni, 2 elegies, an epistle in *versi sciolti*, less grave than the rest of his poetry, and 3 pastorals. His poetry from the first sank deep into the hearts of his countrymen. His sonnets were heard everywhere; his eclogues were acted like popular dramas. The greatest geniuses of his nation express for him a reverence they show to none of his predecessors. Lope de Vega imitates him in every possible way; Cervantes praises him more than he does any other poet, and cites him oftener. And thus Garcilasso has come down to us enjoying a general admiration, such as is hardly given to any other Spanish poet, and to none that lived before his time." The best edition of Garcilasso's poems was published at Madrid in 1765, edited, though it appeared anonymously, by the chevalier Joseph Nicolas de Azara. There is an English translation with a life and an essay on Spanish poetry by J. H. Wiffen (London, 1823). II. A Spanish soldier, and one of the conquerors of Peru, born in Badajoz, died in Cuzco in 1559. He was of the same family with the preceding, and went to Mexico with Pedro de Alvarado, whom he afterward followed in his invasion and conquest of Guatemala. When Alvarado in 1534 invaded the kingdom of Quito, Garcilasso went with him as captain of a company of infantry, and after Alvarado's return to Guatemala remained in Peru and attached himself to the fortunes of Francisco Pizarro, and after his death to those of his brother Gonzalo. He distinguished himself greatly in the contest with the Peruvians and in the civil war that followed the death of Francisco Pizarro. He supported for some time Gonzalo Pizarro in his rebellion against the royal authority; but in the decisive battle of Xaquixaguana, April 9, 1548, he rode over to the royal side at the turning point of the contest, was received with pardon and favor by the viceroy, and appointed governor of Cuzco, an office he held till his death, which, unlike that of most of the companions of Pizarro, took place

in his bed and not by violence. Garcilasso was noted for his humanity to the Indians, and for the effort he made to ameliorate their condition. He married an Indian princess of the blood royal, the niece of Huayna Capac, and granddaughter of the renowned Tupac Inca Ynpaqui. III. Sur-named the Inca, a Spanish historian, son of the preceding, born in Cuzco in 1540, died in Cordova, Spain, in 1616. His early years were passed in Peru, where he was educated in the Roman Catholic religion. In 1560 he went to Spain, where he ever afterward resided. He entered the army, and served as a captain under Don John of Austria, in the war with the Moriscoes. After the war ended he retired to Cordova, and devoted himself to writing American history. His first work, a "History of Florida," appeared in 1605. It is chiefly devoted to the adventures of Fernando de Soto. In 1609 he published the first part of his great work, the "Commentaries on Peru," relating the history of that country under the Incas. In 1616, a few months before his death, he finished the second part, comprising the story of the conquest by the Spaniards. It was published at Cordova the following year. His work gives by far the fullest account of Peru under its native kings, and is in fact the source of almost all our knowledge upon the subject. The author was proud of his descent from the Incas, and obtained much of the material for his history from his mother's family. His "Commentaries" are interesting and valuable, though they contain much that is mere gossip and not a little fable. They have been translated into many languages. An English translation, in 1 vol. fol., by Sir Paul Rycaut, knight, was published at London in 1688, which, though containing numerous errors, is still a favorite with book collectors.

GARD, a maritime department of France, on the Mediterranean, and on the W. bank of the Rhone, near its mouth; area, 2,256 sq. m.; pop. in 1856, 419,697. It derives its name from a small river which rises in the Cévennes, runs through its centre, and falls into the Rhone a few miles above its delta. The Cévennes mountains send ramifications to its centre, while in the S. E. there is a considerable extent of level country, broken by pools and marshes. Iron, argentiferous lead, antimony, zinc, and manganese are mined; coal mines also are wrought, and there are valuable salt marshes on the coast. The arable lands, which comprise scarcely one-fourth of the department, are generally of indifferent quality, and agriculture is backward. The vines are highly esteemed, and olives are grown; but the culture of the mulberry is of paramount importance. Other fine fruits are also abundant. This department ranks among the most industrious in France, and is especially distinguished for its manufactures of silk, beside which it has cotton and woollen mills, tanneries, distilleries, and soap-making establishments. Capital, Nîmes.

GARD, PORT DU, an aqueduct bridge, built over the river Gard, 10 m. N. E. of Nîmes, and one of

the most celebrated relics of Roman power in France. It consists of 3 tiers of arches, one above the other, its entire height being 156 feet from the level of the water. The undermost range consists of 6 arches, through the widest of which the river flows; the middle has 11, and the uppermost 35. This supports a covered canal about 5 feet high and 2 feet wide, which was part of the aqueduct that formerly brought the waters of the Aire and Aure to Nîmes, and other portions of which still remain. The irregular disposition of the arches adds greatly to the picturesque beauty of the structure, which is some 850 feet long. On the invasion of the barbarians, it was partly destroyed; but it is still an object of curiosity and admiration.

GARDA, LAKE (anc. *Benacus Lacus*), the largest of the Italian lakes, situated on the boundary between Lombardy and Venice, between lat. 45° 26' and 45° 54' N. and long. 10° 33' and 10° 54' E. It is 33 m. in length from N. to S., and from 3 to 11 m. in breadth. It is 213 feet above the level of the sea. At its N. extremity the Sarca and some smaller streams discharge their waters into it, while its surplus waters are conveyed to the Po by the Mincio, which issues from its S. E. extremity. It is famous for its fish, especially sardines, the most important, and carp, some of which weigh 80 lbs. Garda, the village from which it takes its name, stands on the E. shore, and was formerly a place of some note.

GARDAIA, or GUARDEIA, a town of Algeria, in the province of Algiers, situated in the oasis of Wady-Nizab, in the Sahara, lat. 31° 57' N., long. 2° 50' E. It is well fortified, having a wall with battlements and 9 large towers, each of which is capable of holding from 300 to 400 men. Ten gates give entrance to the town, which contains a mosque of vast size and 5 smaller ones, beside a Jewish synagogue. The government is nominally administered by a national assembly, presided over by a chief, but the latter is little more than the mouthpiece of the high priest, whose advice has all the force of law. A flourishing trade is carried on with Tunis, Algiers, Bon Sada, &c., in corn, butter, groceries, oil, pottery, and negro slaves. The suburbs of the town contain extensive vineyards and orchards. Rain is almost unknown, but there are numerous wells, some of which are 900 feet deep. On a neighboring eminence are the remains of a large tower supposed to have been built by the Romans. The oasis in which Gardaia is situated submitted to French rule in 1853.

GARDEN. See HORTICULTURE.

GARDEN, ALEXANDER, a British physician and naturalist, born in Scotland in 1728, died in London in 1792. He studied philosophy in the university of Aberdeen, and medicine under Dr. John Gregory, and emigrated to South Carolina near the middle of the century. He acquired a fortune by the practice of physic in Charleston, and a high reputation by his studies in botany and other sciences. In 1764 he declined a professorship in the college recently es-

tablished in New York city. He was a correspondent of Linnaeus, who gave the name of *Gardenia* to one of the most beautiful and fragrant of flowering shrubs. He published accounts of the pink root (*spigelia Marilandica*), of the *helesia*, of the male and female cochineal insects, of the mud *inguana*, or siren of South Carolina, an amphibious animal, of 2 new species of tortoises, and of the *gymnotus electricus*. Returning to England in 1783 on account of his health, he became one of the vice-presidents of the royal society, of which he had before been elected a member.

GARDEN, ALEXANDER, an officer of the American revolution, in Lee's famous legion, died in Charleston, S. C., about 1825, at an advanced age. He was for a time aide-de-camp to Gen. Greene. He wrote "Anecdotes of the Revolutionary War in America, with Sketches of Character of Persons the most distinguished in the Southern States for Civil and Military Services" (1st series, Charleston, 1822; followed by a second series), which is one of the authorities for the history of the period, containing information hardly to be found elsewhere.

GARDINER, a city of Kennebec co., Me., on the W. bank of the Kennebec river, 12 m. below Augusta, at the head of summer navigation, and on both sides of the Cobboscontee; pop. in 1850, 6,486, since which time a part of its territory has been incorporated with other townships. It is largely engaged in manufactures, for which the falls of the Cobboscontee afford great advantages, and it contains 6 saw, shingle, lath, and clapboard mills, 2 large paper mills, a woollen factory, a foundry, 2 machine shops, 3 tanneries, a pottery, and 2 grist mills. There are 10 churches (2 Baptist, 1 Christian, 1 Congregational, 1 Episcopal, of which the bishop of the diocese of Maine is rector, 1 Freewill Baptist, 1 Methodist, 1 Roman Catholic, 1 Swedenborgian, and 1 Universalist), a high school, a newspaper office, 8 banks with an aggregate capital of \$250,000, an alms house, and a mechanics' association with a small library. The mansion of Robert Hallowell Gardiner, which is within the limits of the city, is one of the most magnificent in the state. About 6,000 tons of shipping are owned here, one-half of which is employed in the southern and foreign trade. A bridge 900 feet long connects Gardiner with Pittston on the opposite bank of the Kennebec. The Kennebec and Portland railroad passes through the city.

GARDINER, JAMES, a Scottish soldier, born in Carriden, Linlithgowshire, Jan. 11, 1688, killed Sept. 20, 1745. At the age of 14 he obtained a commission in the Dutch service. He afterward entered the English army, and was present at the battle of Ramillies. In 1780 he was made lieutenant-colonel, and in 1745 commanded a regiment at the battle of Prestonpans, where he was slain. The author of "Waverley" describes the manner of his death with all the minuteness of historical detail and all the embellishments

of romance. In his youth he led a dissipated and reckless life, but in his latter days he became an exemplar of Christian piety and worth. His life has been written by Dr. Doddridge.

GARDINER, STEPHEN, an English Roman Catholic prelate, born at Bury St. Edmund's, in 1483, died Nov. 12, 1555. He was educated at Cambridge, became secretary of Wolsey, and was soon in high favor with Henry VIII. In 1527 he was sent to Italy to procure the pope's consent to the divorce of Queen Catharine. His mission proved unsuccessful, but while at Rome he rendered important services to Wolsey. On his return he was intrusted with the conduct of the divorce case, and successively made secretary of state and (in Nov. 1531) bishop of Winchester. He endeavored to convince the king of the impolicy of breaking with the pope, and of the propriety of punishing those who denied the bodily presence of Christ in the eucharist. The downfall of Cromwell, who had succeeded Wolsey as favorite, added for a time to the influence and power of Gardiner. But the king began at length to lean toward the reformers, and the refusal of Henry to permit the arrest of Catharine Parr for religious contumacy, demonstrated the decline of that prelate's power. On the accession of Edward VI., Gardiner, refusing to approve of the articles and injunctions issued by the new council, was committed first to the Fleet prison, and then, after a short release and new provocation, to the tower, where he was confined till the reign of Mary, when he was restored to liberty and raised to still greater power than ever, being made lord chancellor. The Protestant persecution which took place during his administration has been generally ascribed by Protestant writers to his counsel, but according to Lingard, "more from conjecture and prejudice, than from real information." He is said to have exclaimed on his deathbed: *Erravi cum Petro, sed non fleui cum Petro* ("I have erred with Peter, but I have not wept with Peter").

GARDINER, SYLVESTER, an American physician, born in Kingston, R. I., in 1717, died in Newport, R. I., Aug. 8, 1786. He studied medicine in London and Paris, subsequently practised his profession in Boston, and opened there a drug establishment, from which the New England colonies were chiefly supplied. He was one of the early promoters of inoculation for the small pox, and a liberal contributor for the erection of King's chapel, Boston. He became possessed of large tracts of land in Kennebec co., Me., and about the middle of the century was instrumental in establishing there the settlement of Pittston, a portion of which was subsequently set off into a separate town, under the name of Gardiner, where he built and endowed Christ church. He retired from Boston on its evacuation by the British troops, but returned to the United States at the close of the revolutionary war, and passed the rest of his life here.—JOHN, son of the preceding, an American advocate, born in Boston

in 1731, drowned off Cape Ann, Oct. 1793. He studied law at the Inner Temple, London, and was admitted to practise in the courts at Westminster hall, where his abilities attracted the notice of Lord Mansfield. He formed an intimacy with Churchill and Wilkes, and was junior counsel of the latter at his trial in 1764, and also appeared for Beardmore and Meredith, who for writings in support of Wilkes had been imprisoned on a general warrant. In 1766 he procured the appointment of attorney-general in the island of St. Christopher, where he remained until after the American revolution, when he returned to Boston. After residing there a few years, he removed to Pownallborough, Me., which place he represented in the Massachusetts legislature until his death. As a legislator he distinguished himself by his efforts in favor of law reform, particularly the abolition of special pleading, and the repeal of the statutes against theatrical entertainments. In connection with the latter subject he published a "Dissertation on the Ancient Poetry of the Romans," and an accompanying speech. The abolition of the law of primogeniture in Massachusetts was due to his efforts. He was one of the most influential of the early Unitarians of Boston, and participated in the transformation of King's chapel from an Episcopal into a Unitarian Congregational church.—JOHN SYLVESTER JOHN, son of the preceding, an American clergyman, born in Haverford West, South Wales, England, in June, 1775, died in Harrogate, England, July 29, 1830. He accompanied his father to the West Indies, and subsequently studied in Boston, and in England under the celebrated Dr. Parr, with whom he remained 6 years. Returning to America, he became a candidate for holy orders in the Protestant Episcopal church, and in 1787 was ordained by Bishop Provoost of New York. In 1805 he became rector of Trinity church, the chief Episcopal parish in Boston, with which he remained connected until his death. He was an accomplished classical and belles-lettres scholar, and a forcible preacher. In the establishment of the "Boston Anthology and Monthly Repository," for which he was a frequent writer, he contributed materially to the dissemination of literary taste and culture in Boston. He was also one of the founders of the Boston Athenæum. He wrote the "Jacobiniad," a satire in prose and verse directed against the liberal clubs of Boston, to which, being in politics a strong federalist, he had an antipathy.

GARIBALDI, GIUSEPPE, an Italian partisan general, born in Nice, July 4, 1806. His father educated him to his own profession, that of a mariner. From his earliest childhood he was remarkable for his affection toward his parents and his sincerity to his companions; while a mere boy, at the risk of his own life, he rescued from drowning a poor washerwoman, and in after life he performed similar actions on several occasions. His second voyage was to Rome, when the condition of that capital made

a deep impression on his mind, and led him into those revolutionary views which, in Feb. 1834, resulted in his exile from Italy. He first went to Marseilles, and earned his living by making voyages to various ports. Having been left sick at Constantinople, he became a teacher till he could find an opportunity to reëmbark for Marseilles, whence he sailed for Tunis and thence for Rio Janeiro. At Rio he met Rosetti, with whom he entered into a commercial partnership, but soon discovered that neither of them was suited for a merchant. About this time Zambeccari arrived in Brazil from Uruguay, then fighting for her independence; becoming acquainted with Garibaldi and Rosetti, he persuaded them to espouse the cause of that republic, and Garibaldi, with 20 companions under his command, embarked in a small craft which he named the *Mazzini*. In an engagement with two launches, which he beat off, he received a gunshot wound in the neck, which nearly proved fatal. He landed at Gualaguay on neutral soil, where he was treated with some outward respect and consideration, but he soon discovered that he was to a certain extent a prisoner, being prohibited from moving more than a short distance from the city. He endeavored to escape, but being betrayed by his guide and retaken, he was brought back bound hand and foot, and was tortured nearly to death with the view of extorting from him the names of those who had favored his flight. Two months later he contrived to reach Montevideo, where he found his friend Rosetti, and the two returned to Uruguay and joined a land expedition under Bento Gonzales, in which Garibaldi distinguished himself. Until the termination of the war he was employed in the service of the republic, chiefly at sea, though sometimes on land. Prior to the cessation of hostilities Garibaldi married a South American woman of extraordinary energy and devotion, and she from that time became the companion of all his dangers and privations by sea and land. After the war he returned to Montevideo and taught mathematics, till Rosas the dictator of Buenos Ayres declared war against the republic. The commencement of the war was disastrous; the city itself was besieged, many were seized with panic, the minister of war Vidal robbed the treasury and fled, and public affairs seemed to be on the brink of ruin. Garibaldi organized a flotilla, recommended the formation of an Italian legion (the command of which was conferred on Auzani), and though especially charged with the defence by sea, he frequently fought with and commanded the Italian legion. Montevideo was saved. In the spring of 1848 Garibaldi sailed from South America with a portion of the Italian legion, and on arriving in Piedmont placed himself at the disposal of Charles Albert, by whom he was coldly received. A few days later, the king being defeated, Garibaldi with a few resolute republicans prolonged the resistance until forced across the frontier by a superior Austrian detachment.

Returning to Nice to his mother, wife, and children, his repose was but short. In the autumn he went to Bologna, where, though the people wanted him, the papal government rejected him. On the flight of the pope the new executive gave to Garibaldi a command, sending him to watch the Neapolitan frontier near Rieti, in which situation he remained till the spring of 1849, when the first act of Avezzana, the new minister of war, was to call Garibaldi to Rome and adequately arm and provide for his men. The French expedition to restore the pope having appeared before Rome on April 30 (8,000 infantry, 2 squadrons of cavalry, and 12 guns), Garibaldi was, with 1,200 men, posted in some villas outside the gates. Notwithstanding the disparity of numbers, he attacked the right wing of the French, when Avezzana, who commanded in chief, seeing from the city wall the peril of the Italians, despatched 1,500 men to his succor; whereupon Garibaldi charged the French so vigorously with the bayonet as completely to break them, pursued them several miles, and returned with 800 prisoners. The Neapolitans now threatened Rome, and these were twice beaten by Garibaldi, at Palestrina and Velletri. The French, strongly reinforced, having on June 30 gained a footing inside the wall, the republican triumvirate abdicated. In this moment of general depression Garibaldi resolved to continue the struggle in the open country, and consequently he issued the following proclamation: "In recompense for the love you may show your country I offer you hunger, thirst, cold, war, and death; who accepts these terms, let him follow me." He left Rome to try to penetrate to Venice with about 4,000 men, of whom 800 were mounted, and marching by Tivoli to Terni met the second Italian legion, which was awaiting him. Thence he took to the left to avoid an Austrian corps, but lost many men at Orvieto by a French column. The population was favorable, but being disheartened remained passive; the enemy in immensely superior numbers was fearful and over cautious, and never accepted a general engagement. Garibaldi displayed a wonderful talent in advantageously posting his men at every halt (never in a city), and in so adroitly manœuvring as to extricate himself and leave his enemy behind him every time he appeared to be surrounded. At St. Angelo in Vado some detachments in the city were cut off, which was the only serious loss he sustained. On July 30 he reached San Marino, his force being reduced to 1,800 men, and there he found in his front a fresh Austrian army in addition to the 13,000 pressing on his rear. Terms were now offered, to the effect that there should be a general amnesty and all should return home, the arms being surrendered to the republic of San Marino. Such conditions would have been accepted had a few French belonging to the second legion been permitted to return to Switzerland; but as it was insisted that they should be sent to Rome, where the French

might maltreat them, the offer of the Austrians was rejected without hesitation, and at night about half the force (the rest chose to surrender) made their way toward Cesena; and though vigorously pursued, the remnant, 290 in number, embarked from Cesenatico in some fishing boats on Aug. 2. Making their way toward Venice (then besieged) with the intention of eluding the blockading squadron, the little band was toward nightfall descried by the Austrian fleet in the Adriatic, and the small craft of the patriots were scattered during the night, some captured, and others run ashore. In the boat with Garibaldi were his wife and a few of the most compromised, Ugo Bassi, Ciceroacchio, &c.; and these gained the shore and dispersed in twos and threes to avoid the vigilance of the pursuit. Two days later Anna Garibaldi, who had refused to leave her husband, being worn out by fatigue, died, leaving Garibaldi oppressed with grief. In this state of utter wretchedness, with nothing but his indomitable courage to sustain him, he made his way from the east to the west coast of Italy, while the punishment of death was decreed for whosoever gave him bread, water, or shelter. From Tuscany he embarked for Spezia, and at Chiavari in the states of Sardinia he was arrested and conducted to Genoa. Banished from the states of Sardinia, he arrived at New York in the summer of 1850, declined the public reception offered him, and earned a living by making candles in a manufactory on Staten island till an opportunity occurred of resuming the occupation of a mariner. He made some voyages in the Pacific, and in about 3 years returned to New York in command of a Peruvian bark. Having lost his mother, to whom he had confided the care of his 3 children, he accepted the invitation to return to Nice, where he lived in retirement. In the beginning of 1859, on the breaking out of the war with Austria, he was invited by the Sardinian government to form a corps, since celebrated as the "Hunters of the Alps" (*Cacciatori delle Alpi*). Detached from the rest of the army, he crossed over on its extreme left into northern Lombardy, with a comparatively small force, beat several Austrian detachments, entered, the foremost of the allies, Varese, Lugano, Como, Bergamo, and Brescia, and rendered the most important services to the Italian cause throughout the war.

GARLAND, HUGH A., an American author and politician, born in Virginia, June 1, 1805, died in St. Louis, Mo., Oct. 14, 1854. He was graduated at Hampden Sidney college in 1825, and in 1826 was chosen professor of Greek in that institution. He studied law, and in 1830 resigned his professorship, and in the following year began to practise at the bar in Mecklenburg county. For 5 years he was a member of the Virginia legislature, and actively supported the democratic party. In 1838 he was chosen clerk of the house of representatives at Washington. In 1839, when the house met, Dec. 2, it was found that there were present 119 demo-

crats and 118 whigs, beside 5 whigs from New Jersey whose seats were contested. Their admission to vote for speaker would have secured to the whigs the organization of the house. In accordance with custom, Mr. Garland, as clerk of the last house, opened the session by calling the roll of members. When he came to New Jersey he called one member whose seat was not contested, and said he should pass over the other 5, as he did not feel authorized to decide whether or not they were entitled to seats. This gave rise to a great uproar and confusion, which lasted till Dec. 5, when it was terminated by the interposition of John Quincy Adams, and his election as chairman *pro tempore*. In 1841 Mr. Garland returned to Virginia, and settled on a farm near Petersburg. Engaged unsuccessfully in mercantile business, he lost nearly all his property, and in 1845 he went to St. Louis, and resumed practice as a lawyer. At the time of his death he held a high rank at the bar. Mr. Garland was the author of a "Life of John Randolph" (2 vols. 8vo., New York, 1850).

**GARLIC**, the bulb of the *allium sativum*, a plant of the same genus as the onion (*A. cepa*) and the leek (*A. porrum*). The plant is perennial, and grows wild in the southern parts of Europe. In most other countries it is cultivated, and has been esteemed from the remotest times as an article of food or as a condiment, and also for the sake of its medicinal qualities. The bulbs, 5 or 6 in number, are found clustered around the base of the stem, enclosed in a common membranous covering, by which they are concealed from view. They are taken up attached to the stem, and when dried in the sun are tied together in bunches like onions. The small bulbs are called cloves of garlic. They are of oblong shape, of the strong peculiar odor called alliaceous, and have a bitter and acrid taste. A highly viscid juice may be expressed from them, so tenacious that when dried it makes a cement for porcelain. By distilling the bulbs with water a very volatile essential oil is obtained, which possesses in a high degree the peculiar properties of the bulbs. It is of so acrid a nature that it will even raise blisters upon the skin. Sulphur is detected in this oil combined with a radical called allyle, consisting of C, H, S. When garlic is used as food or medicine, this oil is rapidly absorbed, and its presence is soon perceived in the breath and in the secretions of the body. It is so penetrating, that when garlic is externally applied, as to the soles of the feet, the smell is said to be observed in the breath and perspiration. Its moderate use is thought to be beneficial for its stimulant properties in quickening the circulation, exciting the nervous system, &c. As a medicine it is most employed in external applications, as a sedative in fevers, and in nervous and spasmodic disorders of children.

**GARNET**, the name of a mineral species, presenting many varieties; also applied by Dana to designate a section of the silicates; and in

geology it is the name of a rock made up of some variety of the mineral. The garnet is supposed to have been sometimes included by the ancients in their names *carbunculus* and *hyacinthus*. In its more perfect forms it is a gem, and when cut and polished bears some resemblance to the ruby in color, transparency, and lustre. Some of the precious varieties are distinguished by the names Syrian and oriental, and also almandine, from Alabanda, the place where, in the time of Pliny, they were cut and polished. These and the black varieties also have been much used in Europe, strung together like beads for necklaces. Those most esteemed in jewelry are obtained from Ceylon, Pegu, and Greenland. A single crystal of only  $8\frac{1}{2}$  lines by  $6\frac{1}{4}$  has been sold for about \$700. Its crystals are rhomboidal and trapezoidal dodecahedrons and variously modified forms. Its hardness is from 6.5 to 7.5; specific gravity 3.15 to 4.3. It is met with of various colors, as red, brown, black, yellow, white, and green, and with a vitreous or resinous lustre. According to its composition it has been divided into 6 subspecies, all of which pass into one another by insensible shades of difference; they are all silicates of different protoxides or peroxides; as: 1, the alumina-lime garnet, a silicate of alumina and lime, of which the cinnamon stone or essonite is an example; 2, the alumina-magnesia garnet; 3, the alumina-iron garnet, a silicate of the protoxide of iron and lime, as almandine and a variety of the common garnet; 4, alumina-manganese garnet, called also manganese garnet; 5, iron-lime garnet, composed of silicates of the peroxide of iron and of lime, as the black garnet and a variety of the common garnet; 6, lime-chrome garnet, as the emerald green ouvarovite of Russia. The silicic acid in these varies from 84 to 44 per cent. Their composition is represented by the general formula  $3RO, SiO_2, R_2O, SiO_2$ , in which RO represents either one of the protoxides that may be present, and  $R_2O$ , either the alumina ( $Al_2O_3$ ), or the peroxide of iron ( $Fe_2O_3$ ), or of chrome ( $Cr_2O_3$ ). Garnets are easily melted by the blowpipe; and some varieties, as the melanite or black garnet, found in the lavas of Vesuvius, appear to be a direct product of the fusion of their ingredients. The iron-lime garnets, of which this is a variety, containing from 20 to 30 per cent. of peroxide of iron, and about the same proportion of lime, might be advantageously employed both as iron ore and flux in the manufacture of iron, mixed with other ores more rich in iron and deficient in silica. They frequently occur in the vicinity of iron ores, and in beds of great extent, forming a true garnet rock, and from their highly ferruginous appearance have in some instances been mistaken for iron ores; though when worked they have been condemned from their true character not being understood. Garnet of this character is found in the highlands on the west side of the Hudson river, containing by analyses of two varieties by Dr. A. A. Hayes:

	1.	2.
Quartz and silica .....	83.70	41.88
Lime .....	21.25	23.00
Magnesia .....	8.10	trace
Alumina .....	11.06	6.48
Peroxide of iron .....	24.78	29.00
Peroxide of manganese .....	0.98	trace
Total .....	99.77	98.76

Similar qualities are also met with in the iron region of New Jersey. They frequently contain traces of titanium and of tin.—Crystals of garnet are common in the granite rocks and the metamorphic slates and limestones in almost all localities where these are found; but when most abundant and large, they are commonly rough and unsightly. In the gold region they abound in the slates, and in some instances where the rock that contained them has crumbled away they are left loose upon the surface, so that they might easily be shovelled up by cart loads.

GARNETT, JAMES MEYER, an American politician and agriculturist, born at Elmwood, Essex co., Va., June 8, 1770, died there in May, 1848. He was for several years a member of the legislature of Virginia, and was a representative in congress from 1805 to 1809. In 1829-'30 he was a member of the convention which revised the constitution of Virginia. He acted with the democratic party, and was engaged in several political controversies of note in their day. One of these was with Mathew Carey the protectionist, in which Mr. Garnett contended for free trade. The greater part of his life was zealously devoted to the cause of education and the promotion of agriculture. He maintained a school at his own house for 12 years, and was foremost in introducing improved methods of education into Virginia. For more than 20 years he was president of the agricultural society of Fredericksburg, and exerted himself strenuously for the formation of the United States agricultural society, of which he was chosen the first president. He was a fluent and racy writer, and his contributions to various journals on agricultural subjects were widely read and exercised great influence.

GARNIER, ADOLPHE, a French eclectic philosopher, born in Paris, March 27, 1801. He aided Jouffroy in translating the works of Thomas Reid, was in 1827 appointed professor of philosophy in the college of Versailles, and afterward promoted to a chair in Paris. He meanwhile published his *Précis de psychologie*, and a complete edition of the philosophical writings of Descartes. In 1838 he succeeded Jouffroy as lecturer on philosophy at the Sorbonne, and in the following year produced his *Comparaison de la psychologie et de la phrénologie*. He published in 1850 a *Traité de morale sociale*, and in 1853 a *Traité des facultés de l'âme*, which won a prize from the French academy.

GARNIER, CHARLES GEORGES THOMAS, a French author, born in Auxerre, Sept. 21, 1748, died in the same place, Jan. 24, 1795. He was educated at the college of Plessis, and became an advocate, though the weakness of his voice

did not permit him to speak in public. In 1770 he began to publish in the *Mercur de France*, under the nom de plume of "Mademoiselle Ragner de Malfontaine," dramatic proverbs, whose ingenuity and sprightliness attracted the attention of the governess of the young princess de Condé, and Garnier was soon engaged to write proverbs to be acted for the special amusement of the princess at the abbey of Panthemont. In 1791 he was made *commissaire du roi* at Paris, and in 1798 was sent by the revolutionary government to his native city as commissioner, which post he held till his death. Among his works are *Nouveaux proverbes dramatiques* (8vo., Paris, 1784), and various novels. He also collected and edited the *Cabinet des fées* (41 vols. 8vo., Paris, 1785); *Voyages imaginaires, songes, visions et romans merveilleux* (39 vols. 8vo., Paris, 1787).

GARNIER, CLÉMENT JOSEPH, a French political economist, born at Beuil in Sardinia (which then belonged to France), Oct. 3, 1813, studied at the superior school of commerce in Paris, and was for some time professor and director of studies there. From 1846 to 1856 he filled the newly created chair of political economy in the school of roads and bridges, and since the latter year he has officiated in the same capacity in the school of commerce. From 1845 to 1855 he edited the *Journal des économistes*. In 1846, during the free trade agitation in England, he formed in concert with Bastiat, Chevalier, Fancher, and others, a free trade association, of which he became secretary; but it was dissolved in 1848. In 1842 he had contributed to the establishment of the society of political economy, and still officiates as its perpetual secretary. He was also one of the founders of the peace congress in Paris (1849), and a member of the statistical congress at Brussels (1853), and at Paris (1855). In 1853 he established in concert with M. N. Bourgeois the *Nouveau journal des connaissances utiles*. The 3d edition of his *Éléments d'économie politique* appeared in 1856.

GARNIER, GERMAIN, a French political economist, born in Auxerre, Nov. 8, 1754, died in Paris, Oct. 4, 1821. He was secretary to Adelaide, aunt of Louis XVI., and was noted for slight Anacreontic verses, when in 1790 he became a member of the monarchical club formed in opposition to that of the Jacobins. He emigrated in 1792, returned in 1795, became a prefect under the consulate, and afterward a senator, count of the empire, and president of the senate (1809 to 1811). In 1814 he favored the restoration, was made peer of France, removed from Paris during the Hundred Days, and became minister of state after the second restoration. In political economy he belongs to the school of Quesnay. His most esteemed works are an *Abrégé des principes de l'économie politique* (Paris, 1796); the best French translation of Adam Smith, to which he added many notes (Paris, 1805); and a *Histoire de la monnaie depuis les temps de la plus haute antiquité jusqu'au règne de Charlemagne* (Paris, 1809). He

also translated some of the novels of Godwin and Mrs. Radcliffe.

**GARNIER-PAGES, ÉTIENNE JOSEPH LOUIS**, a French politician, born in Marseilles, Dec. 27, 1801, died in Paris, June 28, 1841. His family being reduced in circumstances, he was educated amid the hardships of poverty. In 1822 he was bookkeeper in a commercial house with a salary of \$300 a year. In 1825 he attended lectures at the *école de droit*, and was admitted to the bar. He became a member of the celebrated association *Aide-toi, le ciel t'aidera*, and actively participated in the revolution of July, 1830. In 1831 he was elected to the chamber of deputies, and took his seat among the members of the opposition. He slowly established his influence by boldness of opinion and moderation of speech. He was not a brilliant orator, but an excellent debater, especially upon financial matters. His ultimate aim was a republic; but he desired to obtain his object by gradual reform. His career was cut short by an early death.—**LOUIS ANTOINE**, a French politician, half brother of the preceding, born in Marseilles in 1805. While employed as a merchandise broker in Paris he found time to attend with his brother at the sittings of the secret associations which aided in the revolution of July, 1830. He organized the means of resistance among the workmen of the district where he resided, and bore arms himself. In 1842 he was elected to the chamber of deputies, and became at once one of the staunchest members of the opposition, and in 1847 was one of the most active promoters of the reform agitation. He was conspicuous among those who in Feb. 1848, appeared at the banquet of Paris, in spite of the prohibition of the government. On Feb. 24 he was appointed a member of the provisional government, then mayor of Paris, and on March 5 he succeeded M. Gondchaux as minister of finance. As a member of the constituent assembly, he submitted a remarkable report on the financial situation of the republic, and left the finance department to enter the executive commission of government appointed by the assembly. On the insurrection of June this commission had to resign its power to Gen. Cavaignac; and Garnier-Pagès, after the expiration of his term as deputy, retired to private life.

**GARONNE** (anc. *Garumna*), a river in the S. of France, rising in the Spanish valley of Aran, in the central Pyrénées, near the foot of Mt. Maladetta, and flowing N. W. into France, which it enters at a place called Pont-du-Roi, in the department of Haute-Garonne. It runs thence N. E. to Toulouse, whence it flows generally N. W.; it passes the towns of St. Béal, Montrejean, St. Martory, Cazères (where it becomes navigable), Carbonne, Muret, Toulouse, Verdun, Agen, St. Macaire, and Bordeaux, a few miles below which it is joined by the Dordogne and forms the estuary or river known as the Gironde. Its chief affluents on the right bank are the Arége, Tarn, Lot, and Dropt; on the left, the Save, Gimone, Gers, Baise, Avance, and Oiron. Its length is about 352 m., of which 262 are

navigable; but including its feeders, which communicate with 12 departments, the total river navigation of its basin may be stated at 1,000 m. Large vessels can ascend to Bordeaux, where the channel is about 800 yards wide and from 10 to 15 fathoms deep. At Toulouse it is joined by the canal du Midi, by means of which and by this river the Mediterranean is connected with the bay of Biscay. The basin of the Garonne includes a tract of country about 185 m. in average length and breadth. The upper part of its course lies through narrow defiles and is much obstructed; from Toulouse it is broad but shallow, and navigation is more or less impeded by the debris which it brings down, even as far as Marmande, about 50 m. above Bordeaux. Its banks are remarkable for fertility and picturesque scenery.

**GARRARD**, a central co. of Ky., bounded N. by the Kentucky river, and E. by Dick's river; area estimated at 250 sq. m.; pop. in 1850, 10,287, of whom 3,176 were slaves. It has a hilly or rolling surface, and a soil of more than common fertility, watered by a number of small streams. The staples are grain, horses, cattle, mules, and swine. The productions in 1850 amounted to 34,920 bushels of wheat, 978,875 of Indian corn, 169,940 of oats, 50,150 lbs. of tobacco, and 30,255 of wool. There were 35 corn and flour mills, 8 saw mills, 8 tanneries, 1 newspaper office, 14 churches, and 115 pupils attending public schools. Value of real estate in 1855, \$2,578,678. The county was formed in 1796, and named in honor of James Garrard, of Kentucky. Capital, Lancaster.

**GARRETTSON, FREEBORN**, a minister of the Methodist Episcopal church in the United States, born in Maryland in 1753, died in New York, Sept. 26, 1827. He entered the ministry in 1775, travelled extensively in several of the states, and in 1784 went as a missionary to Nova Scotia. In 1788 he commenced his labors in the state of New York. In 1791 he married Miss Livingston of Rhinebeck, and confined his subsequent labors to New York, where he was eminently successful. He was a very popular and influential preacher in the Methodist church, and is now frequently referred to as a special friend of the slave, having emancipated a number belonging to him. At his death he made provision in his will for the perpetual support of a missionary.

**GARRICK, DAVID**, an English actor, born in Hereford, Feb. 20, 1716, died in London, Jan. 20, 1779. His grandfather Garric, or Garrique, was a French Protestant who took refuge in England after the revocation of the edict of Nantes. His father, a captain in the English army, settled at Lichfield on half pay, and with difficulty maintained a family of 7 children. At the age of 10 David was sent to Mr. Hunter's grammar school. He was a lively, volatile boy, a great mimic, and at 11 acted in a play, the "Recruiting Officer," before a select audience with great applause. He was manager of the company, and applied to Johnson for a prologue,



but without success. In 1728 or '29 he went to Lisbon to visit an uncle, a considerable wine merchant. Here he amused dinner parties by repeating verses and popular speeches. But he returned the next year to England, and attended the theatres at London during occasional visits there. At 18 he was one of the 8 scholars at Dr. Johnson's academy. In March, 1736, he set out with his master for London. Johnson and Garrick entered the metropolis with little money and a single letter of introduction. Garrick now proposed to study law; he even entered at Lincoln's Inn, but poverty interrupted his studies. His uncle soon after died, leaving him £1,000, and he next commenced business as a wine merchant, in connection with his brother Peter, but the partnership was soon dissolved. Foote used to say that he remembered Garrick when, "with 8 quarts of vinegar in his cellar," he called himself a wine merchant. He was now constant at the theatres. He wrote theatrical criticisms, practised declamation, and in the summer of 1741 made his first appearance as an actor at Ipswich, under the assumed name of Lyddal, taking the part of Aboan in the play of "Oroonoko." His face was blackened, and he trembled with diffidence; but the provincial audience was delighted. He soon tried comic parts, and crowds came to see him; as Harlequin his success was complete. But when he applied for employment to the managers of Drury Lane and Covent Garden, both rejected him. He made his first appearance in London at a little playhouse in Goodman's fields, Oct. 19, 1741, acting Richard III. to a small audience with great effect. His fame spread rapidly; the great theatres were deserted, and all the fashion came to Goodman's fields; Garrick's natural acting charmed a public weary of the rant and affectation of Macklin or Quin. He next made an engagement at Drury Lane for £500 a year. In 1742 he went to Dublin, and was received with great enthusiasm. In 1748 he gained the friendship of Pitt, afterward earl of Oatham, and of Lyttleton. Pitt wrote him complimentary verses, and Lyttleton praised him in his "Dialogues of the Dead." Garrick was now the first of English actors; he excelled in comedy, farce, tragedy, and pantomime. In 1745 he again visited Dublin, and was for a time joint manager there with Mr. Sheridan. In 1747 he bought a half interest in Drury Lane theatre, and on Sept. 20 opened his management with the famous prologue written by Johnson. He soon after brought out Johnson's "Irene" with considerable profit to the author. In July, 1749, Garrick married the German dancer, Mlle. Violette, who is said to have brought him £6,000. She was accomplished, intelligent, and a faithful wife, and survived him till 1822, when she died suddenly at the age of 98. In 1758 Garrick brought out the "Gamester," by Edwin Moore; he refused Home's "Douglas" in 1756. He was singularly sensitive, trembled before adverse criticism, and assiduously courted the critics. In Sept. 1763, he went to the con-

tinent, and was received everywhere with attention and respect. He returned in 1765, and in November reappeared in "Much Ado about Nothing," at the command of the king, amid unbounded applause, having opened the performance with an address to the public which was called for on the 10 succeeding nights. In Sept. 1769, he arranged a jubilee in honor of Shakespeare at Stratford-on-Avon, which continued 8 days, and which he afterward represented for 92 successive nights at Drury Lane. In 1778, his partner, Mr. Lacy, having died, the whole management of the theatre fell to his charge. His health failing, he now seldom acted; and on June 10, 1776, after having played a round of his old and favorite characters, he took his leave of the stage in the part of Don Felix, in the comedy of the "Wonder," the performances being for the benefit of the fund for the relief of decayed actors, which he had originated. A crowded and distinguished audience was present, and he closed the evening with a farewell address which drew tears from them and himself. Having amassed a very considerable fortune, he now retired to enjoy it. His villa at Hampton was adorned with all the charms of luxury and taste. Bishops and princes visited the retired actor, and Hannah More here passed many agreeable hours. His later years were filled with suffering. The gout and gravel, to which he had long been subject, returned upon him with increasing severity. He endeavored to maintain his usual gayety, and was passing the Christmas holidays at the seat of Earl Spencer, when a sudden attack prostrated him. He was carried to his house in the Adelphi, London, and there died. He was buried on Feb. 1, 1779, with great splendor; all that was eminent in London followed the comedian to his grave. He was buried beneath the monument of Shakespeare, and here a monument has been raised to his memory at the expense of one of his admirers, Mr. Albany Wallis. Garrick's talents were singularly versatile. He wrote farces and comic pieces, conversed well, and was a member of the literary club. He succeeded in every kind of acting. His comic turn led him to delight in broad farces, in feats of dexterity and ludicrous transformations. As Hamlet he filled his audience with horror and melancholy; in the part of Lear he rose to the height of tragic power. Yet he labored under several disadvantages. He was of middle size, delicate in form, and quick in movement, wanting that dignity of appearance with which nature has endowed other actors. His memory, too, sometimes failed him, and he would repeat a line before he could recover himself. But his voice was melodious and clear, his countenance animated, and his sensitive temperament, even in his silence, governed the spectator. His thrills of feeling communicated themselves by look, gesture, and position. He felt the emotion he inspired. He was a man capable of many generous acts, somewhat vain, but good-humored and placable, a kind friend, and charitable to

the poor. In spite of a certain want of dignity in his manners, and a constant affectation, he was respected and liked by his contemporaries. Dr. Johnson, who dictated to Davies many particulars of his life, always spoke of him as kind-hearted and honest, as well as great.

GARRISON, WILLIAM LLOYD, an American abolitionist, born in Newburyport, Mass., Dec. 10, 1803. His parents were natives of the province of New Brunswick. His father, Abijah Garrison, was master of a vessel engaged in the West India trade, and a man of some literary ability and taste; but he became intemperate, and, under the influence of that vicious habit, went away from his family while his children were young, and never returned. The mother, left in utter poverty, became a professional nurse, and in 1814 went to Lynn, taking William with her, and placing him with Gamaliel Oliver, a Quaker, to learn the trade of a shoemaker. He was extremely small for his age, and his knees trembled under the weight of the lapstone. His mother, finding that the business did not suit him, sent him back to Newburyport at the end of 3 or 4 months, placing him under the care of Deacon Ezekiel Bartlett. In order to relieve his mother from the necessity of paying his board, he employed himself when out of school in assisting the deacon in his occupation as a woodsawyer, going with him from house to house. At school he was taught reading, writing, ciphering, and a smattering of grammar. In 1815 he went with his mother to Baltimore, where he remained a year, in the capacity of a chore boy, and then returned to Newburyport. In 1818 he was apprenticed to Moses Short, a cabinet-maker, in Haverhill; but, as he strongly disliked the trade, he persuaded Mr. Short to release him. In October of the same year he was indentured to Ephraim W. Allen, editor of the "Newburyport Herald," to learn the art of printing. This occupation suited his tastes; he quickly became an adept at the mechanical part of the business, and when only 16 or 17 years of age began to write upon political and other topics for the "Herald," carefully preserving his incognito. It was a long time before Mr. Allen learned that the correspondent whose communications he eagerly sought and commended was his own apprentice, who often had the satisfaction of putting his own articles into type, and once received through the post-office a letter of thanks from his master, with a request that he would continue to write. He soon commenced writing also for the "Haverhill Gazette," the "Salem Gazette," and the "Boston Commercial Gazette," all of which received his contributions with favor. The editor of the journal last named, Samuel L. Knapp, Esq., appreciated his articles very highly. A series of articles which he wrote for the "Salem Gazette," under the signature of "Aristides," attracted much attention in political circles, being commended by Robert Walsh, at that time editor of the Philadelphia "National Gazette," who attributed them to the venerable Timothy Pickering.

In 1824, during the somewhat protracted absence of Mr. Allen, he edited the "Herald," superintending the printing at the same time. The struggle of the Greeks for freedom fired his youthful zeal, inasmuch that at one time he seriously contemplated entering the academy at West Point, to qualify himself for a military career. In 1826, his apprenticeship being honorably closed, he became the proprietor and editor of a journal in his native town, called the "Free Press." He toiled hard, generally putting his editorial articles in type without committing them to paper, but the enterprise proved unsuccessful. He then went to Boston, where he worked for a time as a journeyman. In 1827 he became the editor of the "National Philanthropist" in that city, the first journal ever established to advocate the cause of "total abstinence;" but before the end of the year the proprietorship changed, and he was induced, early in 1828, to join a friend in the publication of the "Journal of the Times" at Bennington, Vt. This journal supported John Quincy Adams for the presidency, and was in part devoted to peace, temperance, anti-slavery, and other reforms; but it failed to receive an adequate support. During his residence in Bennington, he produced considerable excitement upon the subject of slavery, not only in that place but throughout the state, in consequence of which there was transmitted to congress an anti-slavery memorial more numerous than any similar paper previously submitted to that body. Benjamin Lundy, an advocate of the gradual abolition of slavery, was then engaged in publishing the "Genius of Universal Emancipation" at Baltimore. He had met Mr. Garrison during the previous year in Boston, and received from him timely assistance in bringing his cause to the notice of the people of that city. Admiring his talents and zeal, and wishing for a coadjutor, he went to Bennington, and engaged Mr. Garrison to join him in the editorship of his journal. On July 4, 1829, Mr. Garrison delivered in Park street church, Boston, at a religious and philanthropic celebration of the day, an address which excited general attention by the boldness and vigor of its assault upon slavery. In the autumn of that year he began his labors in Baltimore as joint editor with Mr. Lundy of the "Genius of Universal Emancipation," and in the first number issued under his supervision he made a distinct avowal of the doctrine of immediate emancipation as the right of the slave and the duty of the master. Mr. Lundy did not concur with him in this doctrine, but as each of them appended his initials to his articles, the difference interposed no barrier to hearty coöperation. The journal, by its bold and uncompromising tone, produced considerable excitement among the supporters of slavery, while Mr. Garrison's denunciations of the colonization society aroused the hostility of some who, upon other grounds, were inclined to sympathize with him. An event soon occurred which resulted in a dissolution of his connection with the paper.

The ship *Francis*, owned by Francis Todd of Newburyport, having taken a cargo of slaves from Baltimore to Louisiana, Mr. Garrison denounced the act as a "domestic piracy," and declared his purpose to "cover with thick infamy" all those implicated therein. Baltimore being then the seat of an extensive domestic traffic in slaves, his denunciation produced a great deal of feeling, and he was in consequence indicted and convicted, in the city court, May term, 1830, for "a gross and malicious libel" against the owner and master of the *Francis*, though it was proved by the custom house records that the number of slaves transported was much greater than he had alleged. He was sentenced to pay a fine of \$50 and costs of court. He was defended by Charles Mitchell, who held a position at the Baltimore bar second only to that of William Wirt. Being unable to discharge the judgment, he was committed to gaol. Mr. Todd, in a civil suit for damages, subsequently obtained a verdict against him for \$1,000; but the judgment, probably on account of his well-known poverty, was never enforced. During his incarceration, he occupied a cell just vacated by a man who had been hanged for murder. He was, however, treated very kindly by the gaoler, and in the daytime had the liberty of the yard. He at once interested himself in the cases of some of his fellow prisoners, and was instrumental in procuring the release of some who were deserving of merciful consideration, by writing petitions in their behalf to the governor. He eagerly embraced the opportunities afforded him for conversing with speculators in slaves, who came to the prison to purchase recaptured slaves, always urging his anti-slavery opinions upon them. His friend Lundy and a few other Quakers were the only persons who visited him to express their sympathy. The press at the North generally condemned his imprisonment as unjust. His letters to different newspapers excited a deep interest, and several sonnets which he inscribed on the walls of his cell were spoken of in influential quarters as worthy of an honorable place in literature. The manumission society of North Carolina protested against his imprisonment as an infraction of the liberty of the press. He remained in gaol 49 days, when Arthur Tappan, a merchant of New York, paid the fine and costs, and he was set at liberty. It subsequently appeared that Mr. Tappan had, in this act, anticipated by a few days the generous purpose of Henry Clay, whose interposition had been invoked by a mutual friend. Daniel Webster, soon after his release, gave him willing audience, and addressed him in words of sympathy and encouragement. His next step was to issue a prospectus for an anti-slavery journal, to be published in Washington; and with a view to excite a deeper interest in his enterprise, he prepared a course of lectures on slavery, which he subsequently delivered in Philadelphia, New York, New Haven, Hartford, and Boston. In Baltimore, his attempts to obtain a hearing were

unsuccessful. Private efforts to procure a suitable place for the delivery of his lectures in Boston having been made in vain, he advertised in one of the daily journals that, if a meeting house or hall were not offered before a certain day, he would address the people on the common. An association of persons calling themselves infidels thereupon proffered him the gratuitous use of a hall under their control, and, no other offer being made, he delivered his lectures in the place thus opened; taking care, at the same time, to avow his faith in Christianity as the power which alone could break the bonds of the slaves. His lectures were attended by large audiences, and awakened in some minds a permanent interest in the anti-slavery cause. His experiences as a lecturer, however, convinced him that Boston rather than Washington was the best location for an anti-slavery journal, and that a revolution of public sentiment at the North must precede emancipation at the South. He accordingly issued the first number of the "*Liberator*" in Boston, Jan. 1, 1831, taking for his motto: "My country is the world, my countrymen are all mankind;" and declaring, in the face of the almost universal apathy upon the subject of slavery: "I am in earnest, I will not equivocate, I will not excuse, I will not retreat a single inch, and I will be heard." Mr. Isaac Knapp was his partner in the printing and publishing department. As they were without capital or promise of support from any quarter, they were unable to open an office on their own account. The foreman in the office of the "*Christian Examiner*," being a warm personal friend of Mr. Garrison, generously employed him and his partner as journeymen, taking their labor as compensation in part for the use of his types. Mr. Garrison, after working mechanically in the daytime, spent a large portion of the night in editorial labor. Having issued one number, they waited anxiously to see whether they would find encouragement to proceed. The receipt of \$50 from James Forten, a wealthy colored citizen of Philadelphia, with the names of 25 subscribers, was the first cheering incentive to perseverance, and the journal was issued without interruption from that day. At the end of 8 weeks they opened an office for themselves; but for nearly 2 years their resources were so restricted that they made the office their only domicile. Their bed was made on the floor, and they subsisted upon the humblest fare. The "*Liberator*" attracted general attention, not only at the North, but at the South. In some quarters it found sympathy, in others it was denounced as fanatical and incendiary. The mayor of Boston, Harrison Gray Otis, having been appealed to by a southern magistrate to suppress it, if possible, by law, wrote in reply that his officers had "ferreted out the paper and its editor, whose office was an obscure hole, his only visible auxiliary a negro boy, his supporters a very few insignificant persons of all colors." Almost every mail, at this period, brought letters threatening Mr. Garrison with assassination if

he did not discontinue his journal; and in Dec. 1831, the legislature of Georgia passed an act, offering a reward of \$5,000 to any person who should arrest, bring to trial, and prosecute to conviction, under the laws of that state, the editor or the publisher. Many of Mr. Garrison's friends, deeming his life seriously imperilled, besought him to arm himself for defence; but, being a non-resistant, he was conscientiously restrained from following their advice. On Jan. 1, 1832, he secured the coöperation of 11 others with himself in organizing the New England (afterward Massachusetts) anti-slavery society, upon the principle of immediate emancipation. This was the parent of those numerous affiliated associations by which the anti-slavery agitation was for many years maintained. In the spring of 1832 he published a work entitled "Thoughts on African Colonization," &c., in which he set forth at length the grounds of his opposition to that scheme. He went immediately afterward to England, as an agent of the New England anti-slavery society, to solicit the coöperation of the people of that country in measures designed to promote emancipation in the United States, and to lay before them his views of the colonization project. He was warmly received by Wilberforce, Brougham, and their associates. In consequence of statements made by Mr. Garrison, Wilberforce and 11 of his most prominent coadjutors issued a protest against the American colonization society, pronouncing its plans delusive, and its influence an obstruction to the abolition of slavery. He also succeeded in inducing Mr. George Thompson, one of the most prominent champions of the anti-slavery cause in Great Britain, to come to the United States as an anti-slavery lecturer. Soon after Mr. Garrison's return, the American anti-slavery society was organized at Philadelphia, upon the principles of which he was the champion. The "Declaration of Sentiments" issued by the association—an elaborate paper, setting forth its principles, aims, and methods—was prepared by him. The agitation previously excited was now greatly intensified, and at length awakened a resistance which manifested itself in a mobocratic spirit, inasmuch that for 2 or 3 years the holding of an anti-slavery meeting almost anywhere in the free states was a signal for riotous demonstrations, imperilling property and life. Mr. Thompson's arrival from England in 1834 inflamed the public mind to such a degree that at length, by the advice of his friends, he was induced to desist from his labors and return to his native land. In Oct. 1835, a meeting of the female anti-slavery society of Boston was riotously broken up by a collection of persons, described in the journals of the day as "gentlemen of property and standing." Mr. Garrison, who went to the meeting to deliver an address, after attempting to conceal himself from the fury of the mob in a carpenter's shop in the rear of the hall, was violently seized, let down by a rope from the window to the ground, and, partly denuded of his clothing, dragged through the streets to the city hall; whence, as

the only means of saving his life, he was taken to gaol by order of the mayor, upon the nominal charge that he was "a disturber of the peace." He was released on the following day, and, under protection of the city authorities, escorted to a place of safety in the country. These scenes of violence were followed by a discussion of the peace question, in which he took an earnest part as a champion of non-resistance; and in 1838 he led the way in the organization of the New England non-resistance society. The "Declaration of Sentiments" issued by that body was prepared by him. About this time, the question of the rights of women as members of the anti-slavery societies began to be mooted, Mr. Garrison contending that, so far as they wished to do so, they should be permitted to vote, serve on committees, and take part in discussion, on equal terms with men. Upon this question there was a division of the American anti-slavery society in 1840; and in the "World's Anti-Slavery Convention," held that year in London, Mr. Garrison, being a delegate from that society, refused to take a seat because the female delegates from the United States were excluded. In 1843 he was chosen president of the society, and has continued to hold the office till this time (1859). He was ever earnestly opposed to the formation of a political party by the abolitionists, from a conviction that such a measure would inevitably corrupt the purity of the movement and postpone the day when emancipation might be secured. He never sought or contemplated the abolition of slavery in the states by congress, or any other branch of the national government, his views as to the powers of that government over the subject being the same that were generally held by statesmen of all parties at the North, as well as by many at the South. His first idea was, that slavery might be abolished by moral influence, with such incidental aid as the national government could constitutionally afford, and without disturbing the union of the states; but upon this point he at length changed his opinions, his observation of the movements of political parties and his reflections upon the provisions of the constitution relating to the subject leading him to the settled conclusion that some of the conditions of compact between the free and the slave states were immoral, and that a dissolution of the Union was necessary to the freedom of the North and the emancipation of the slaves. In 1846 he made his third visit, for anti-slavery purposes, to Great Britain. In 1848 a small volume of his "Sonnets and other Poems" was published; and in 1852 appeared a volume of "Selections" from his "Writings and Speeches" (12mo., Boston.)

GARROTE, a mode of execution practised in Spain and the Spanish colonies. The criminal is seated in a chair or on a stool, and leans his head back against a support prepared for it. An iron collar closely encircles the throat. The executioner quickly turns a screw, the point of which penetrates the spinal marrow where it

unites with the brain and causes instantaneous death. Formerly the garrote was merely a cord put round the neck and suddenly tightened by the twisting of a stick inserted between the cord and the back of the prisoner's neck. Hence the name of this mode of execution, *garrote* in Spanish signifying stick. Its origin may probably be traced through the Moors or Arabs to the oriental punishment of the bowstring, which in its primitive style it exactly resembled. Afterward an iron collar was used by which the criminal was suddenly strangled. The piercing of the spinal marrow is a later improvement.

GARTER, ORDER OF THE, the highest British order of knighthood, and one of the oldest and most illustrious of the military orders of knighthood in Europe, commonly said to have been instituted by Edward III. of England about 1350. The precise date of its foundation has been much disputed. In Rastell's "Chronicle" it is stated that the order was devised in 1192 by Richard I., who made 26 of his knights wear blue thongs of leather around their legs in a battle fought with the Saracens on St. George's day. In the accounts of the great wardrobe the garters of the order are first mentioned in 1348. Most writers agree that its institution dates from a tournament at Windsor, to which Edward invited the most illustrious knights. It was founded in honor of the Trinity, the Virgin Mary, St. George, and St. Edward the Confessor; and St. George, who was already the tutelary saint of England, was considered its especial patron and protector. An ancient tradition connects the emblem of the order with the story popularly told of Edward and the countess of Salisbury. When she happened at a ball to drop her garter, the king took it up and presented it to her, at the same time exclaiming, with reference to those who smiled at the action: *Honi soit qui mal y pense* ("Evil to him who evil thinks"). Edward added "that shortly they should see that garter advanced to so high an honor and renown as to account themselves happy to wear it." This is the common account of the origin of the emblem and motto, though others suppose them to have had reference to Edward's claim to the crown of France and to the wars in that kingdom. The original dress of knights of the garter was a blue mantle, tunic, and capuchin, cut in the fashion of the time, and all embroidered with garters of blue silk and gold, the largest of which, bearing the device, was on the left shoulder of the mantle. It was remodelled by Henry VIII., and changed for the last time by Charles II. It now consists of the garter of dark blue velvet, edged with gold and bearing the motto in golden letters, and worn on the left leg below the knee; the mantle of blue velvet, lined with white taffety, and having on the left breast the star, which is the cross of St. George irradiated with beams of silver, and encircled with the garter; the hood, of crimson velvet; the surcoat, also of crimson velvet, lined with white taffety; the hat, of black velvet, lined with white taffety, and bear-

ing an ostrich and heron plume; the collar, composed of 26 pieces of gold, each in the form of a garter, and having the ground enamelled blue; the figure of St. George on horseback, encountering the dragon, appended to the collar; and the lesser St. George, enamelled on gold and set with diamonds, suspended by a dark blue ribbon over the left shoulder. The number of knights companions was originally 25 beside the sovereign, who nominates the other knights. The queen and wives of the knights at first shared the honors of the fraternity, were styled *dames de la fraternité de St. George*, and wore robes and hoods adorned with the garter; and an attempt to revive this ancient usage was made in the reign of Charles I. The original number of knights remained unchanged till 1786, when a statute was passed making it 26 exclusive of princes of the royal family and of illustrious foreigners on whom the honor might be conferred. By a statute of 1805 the order is to consist of the sovereign and 25 knights companions, together with such lineal descendants of George II. as may be elected. But the prince of Wales, as a constituent part of the original institution, is counted among the 25 companions. By special statutes, proclaimed at different times, foreign sovereigns and extra knights have been admitted, the latter of whom on the occurrence of vacancies always become part of the 25. The whole number at present is 41, 26 of whom are knights companions, Lord Derby having been made an extra knight after the close of his ministry in 1859. The officers of the order are a prelate, who is always the bishop of Winchester; a chancellor, formerly the bishop of Salisbury, but since 1887 the bishop of Oxford (Windsor, which is in Berkshire, having been then transferred to that diocese); a registrar, the dean of Windsor; a garter principal king-at-arms, who carries the rod and sceptre at the feast of St. George, notifies the election of new knights, and is chief of the heralds; and the usher of the black rod. The chapter meets on St. George's day (April 28) in St. George's chapel, Windsor, where the installations take place, and the banners of the knights are suspended.

GARTH, SIR SAMUEL, an English physician and poet, born in Yorkshire, died in London, Jan. 18, 1718. He studied medicine at Cambridge, and settling in London in 1693, soon secured an extensive practice, and became noted for his classical taste, liberality, and social habits. A quarrel had existed for some years between the physicians who advocated, and the apothecaries who opposed the establishment of a free dispensary for the poor. Garth sided with the former, and wrote in their support the "Dispensary," a satirical poem in imitation of Boileau's *Lutrin*. It was published in 1699, passed through 3 editions in a few months, and reached the 9th in 1706, having been modified and improved in each. In the heroic couplet afterward so effectively employed by Pope, and with the supernatural machinery of the ancient

epic, its dry theme is well sustained through 1,000 lines; but it is now regarded only as a literary curiosity. Garth was the leading whig physician of the time, was a member of the Kit-cat club, and the intimate associate of Addison (for whose "Cato" he wrote an epilogue), Dryden, Congreve, Swift, Pope, &c. He wrote several short poems, and superintended a translation of Ovid's "Metamorphoses" (1717), to which Dryden, Addison, Gay, and many others contributed. He translated the 14th and part of the 15th book, and wrote the preface, in which he recommends the moral purpose of the work. He was knighted by George I. in 1714.

GÄRTNER, JOSEPH, a German botanist, born in Calw, Württemberg, March 22, 1732, died July 13, 1791. He studied theology, jurisprudence, and the natural sciences at Tübingen and at Göttingen, travelled in Italy, France, England, and Holland, became professor of anatomy at Tübingen in 1761, and of botany at St. Petersburg in 1768. He returned to Calw after 2 years, where he devoted himself for the remainder of his life to the study of botany, making several long journeys for that purpose. His labors mark an era in the history of this science, since, while other botanists had proposed only the different characteristics of the flower as a basis for classification, he was the first to observe that plants are naturally divided into classes by the general plan and features of their construction. His principal work is *De Fructibus et Seminibus Plantarum* (Stuttgart, 1789-'91).

GAS (Sax. *gast*, Dutch *geest*, Ger. *Geist*, spirit), a generic term designating any elastic fluid which is neither liquefied nor solidified at ordinary temperatures and pressure. Van Helmont introduced the name, first applying it to carbonic acid generated by fermentation, which he described as a non-coagulable spirit. Boyle afterward made use of the term artificial air, and recognized different varieties of the elastic fluids. In 1757 the nature of the so called fixed air or carbonic acid was determined by Dr. Black, and the composition of other gaseous bodies was soon after investigated by the chemists, with whom this became a favorite department of research. The principal gases are described in this work under their respective names, and the physical properties of elastic fluids are treated in the article ATMOSPHERE.—In ordinary use, by the term gas is understood that mixture of inflammable elastic fluids obtained from bituminous coal or other carbonaceous substances for illuminating purposes. A natural product of similar character has been known in various countries from remote times, issuing from crevices in the earth, and appears to be the result of substances of organic origin slowly undergoing decomposition. Though the supplies of the gas appear to be inexhaustible, inasmuch as it has continued to issue at the same localities for many centuries, its source is not always in beds of coal, but frequently in formations below the coal measures. The most celebrated natural fountains of this kind are in the ter-

tiary strata on the borders of the Caspian sea, described in the article BAKOO. In the western part of the state of New York they issue from the slates and sandstones of the Portage group, and the gas is so abundant and pure that it is collected in gasometers and conveyed in pipes to be used for lighting villages. The town of Fredonia has been thus illuminated for many years, and also the lighthouse at Portland harbor on Lake Erie. The Chinese have long made use of the jets of gas they struck in their salt wells, applying it as fuel in evaporating the brine, and as an illuminating agent for their buildings and streets. Instances have been noticed in the article COAL of its bursting out in penetrating beds of this material. It has also issued in copious streams from beneath great bogs when these were pierced and the boring was continued through beds of marl and sand which underlaid them. This was observed at Chatmoss, on the line of the railway between Manchester and Liverpool, in Dec. 1851. The gas rose rapidly through a 10 or 12-inch pipe sunk in the ground over the hole which tapped its source, and issuing from this at the height of 86 feet was then ignited, and burned with a yellowish flame extending upward some 8 or 9 feet. Numerous other instances of such phenomena in various countries might be referred to. The natural inflammable gas is known by various names, as light carburetted hydrogen, fire damp, and marsh gas, the last name having reference to its bubbling up through the waters covering marshy places. It possesses less carbon than the other variety of carburetted hydrogen, called olefant gas, which is obtained in mixture with it in the process of the destructive distillation of bituminous coal, and which, with the vapors of other hydrocarbons rich in carbon, gives to the artificial product a much higher illuminating power than that of the natural gas. The peculiar qualities of this mixture will be considered after tracing out the history of the application of gas to illuminating purposes, and noticing the materials employed. The practicability of collecting the gas expelled from coal by subjecting this to heat appears to have been first discovered by Dr. Clayton, rector of Crofton, Wakefield, Yorkshire. The account of his experiments is preserved in a letter to the Hon. Robert Boyle, dated May 12, 1688, and published in the "Transactions of the Royal Society," 1789. He distilled some coal in a retort, and accidentally discovered the inflammability of the "spirit" which issued forth, bursting through the lute. He collected this spirit in bladders, which he kept, and amused his friends by puncturing them, and burning the invisible fluid as it escaped through the aperture. Dr. Hales in his work on "Vegetable Statics," 1726, describes a similar experiment he had made, and his obtaining 180 cubic inches of inflammable air from 158 grains of Newcastle coal. In 1786 Lord Dundonald of Scotland engaged in distilling coal, chiefly it appears from

the tar, and the next year took out a patent for the process. He constructed apparatus for burning the gas, merely, however, as a curiosity, and his workmen employed the waste gas for giving them light. The first experiments for the direct purpose of introducing gas as an illuminating agent were made in 1792 by Mr. Murdoch, then residing at Redruth in Cornwall. In 1797 he brought his operations into public notice, and the next year fitted up an apparatus for lighting part of the manufacturing establishment of Boulton and Watt near Birmingham, with which he had become connected. A Frenchman named Le Bon was engaged about the same time in similar experiments in France; and by means of gas which he obtained from wood he succeeded in lighting and warming his house. In 1808-'4 the lyceum theatre in London was lighted with gas under the direction of Mr. Winsor, one of the earliest advocates for its general introduction. In 1804-'5 Mr. Murdoch constructed the largest apparatus hitherto made, and lighted the mills of Messrs. Phillips and Lee at Manchester, distributing an amount of light through the building equal to that of nearly 8,000 candles. In 1818 Westminster bridge was lighted with gas, and the next year the streets also of this part of London. The manufacture was greatly improved by the researches of Dr. Henry the chemist, and by the apparatus, including the wet gas-meter, invented by Mr. Clegg, an engineer employed by Boulton and Watt. Gas from refuse oily and fatty matters was first prepared on a large scale by Mr. Taylor, who obtained a patent for the process in 1815. The manufacture was conducted at the gas works in London, Paris, and other cities; but though the gas was of superior quality, more dense than that from coal and more highly carburetted, the cost of the raw material was too great in comparison with that of coal for the business to prosper. It has of late years been successfully introduced in the United States, principally with small apparatus for single buildings, and with the employment of the cheap rosin oil. This is converted into gas, as it is dropped upon a heated surface, and, without the necessity of the purifying apparatus required for coal gas, it is conducted into the gasometer for distribution as it is required. It may be regarded as one of the most perfect, simple, and economical methods of obtaining a beautiful artificial light. Rosin itself has also been applied directly by an apparatus in which it was melted, and in this state allowed to enter the heated retort for conversion into gas. The process, however, was not an economical one. Animal matters distilled for the production of bone black evolve inflammable gases, and these have been applied to purposes of illumination by Seguin. Gas has been made from wood for some time past at the Market street bridge works in Philadelphia, and 6 retorts have been kept in use. In Germany wood gas has been employed to some extent for lighting towns. The wood, well

dried, is introduced into red-hot retorts, and the gas which is immediately given off is conveyed through the usual apparatus for purifying coal gas. Tar is obtained in large quantity, and the charcoal, which is finally removed from the retort and quenched with wet sand, is more valuable than the coke residue of the distillation of bituminous coal. In Munich retorts are used holding 90 lbs. of wood. They are freshly charged every hour and a half. The operation is conducted with great facility, and the retorts are not injured by the fire as in the coal gas manufacture. Wood gas is usually considered inferior to coal gas, from deficiency of carbon, unless passed through some liquid hydrocarbon, as naphtha, benzole, oil of turpentine, or over incandescent charcoal. Samples of gas from old field pine and from smaller second growth oak have been found, by the analyses of Dr. Wollcott Gibbs and Dr. F. A. Genth, to present the following composition:

	Gas from pine.	Gas from oak.
Hydrogen.....	52.71	50.44
Light carburetted hydrogen.....	21.50	23.13
Oleasant gas and hydrocarbon vapors.....	10.57	6.46
Carbonic oxide.....	27.11	26.11
Carbonic acid.....	4.90	0.48
Oxygen.....	0.66	none
Nitrogen.....	2.55	3.89
Total .....	100.00	100.00
Specific gravity of gas.....	0.663	0.559

—In Philadelphia works were put in operation in 1858 designed for making gas from water, or at least obtaining from this its hydrogen, and, while in the nascent state, introducing it to carbon also in the act of separating from its combination with other substances. Steam at 20 lbs. pressure is passed through a round retort filled with incandescent wood coal, by which it is said to be decomposed and to yield 56 per cent. of hydrogen. This is immediately delivered into another red-hot retort, in which rosin or rosin oil is employed for making gas by dropping it in upon the heated surface. Illuminating gas is reported to be made by this method at the extremely low price of 48 cents per 1,000 feet, and by one report even at 36 cents; but there appears to be a difficulty in furnishing the proportion of hydrogen required, and instead of the operation regulating itself, it is found necessary to keep a man most of the time attending to the two stopcocks. Practical difficulties are experienced by the deposition of free carbon in the form of soot upon the inside of the retorts, and carbonic acid and carbonic oxide are also generated. The vapors of benzole have been advantageously employed for illumination by passing through the liquid a current of common air or of steam, which takes up and carries along the vapor, the properties of which it modifies according to the proportion of air or steam employed. (See BENZOLE.) Peat has been successfully distilled upon a large scale for the production of illuminating gas; and another material profitably employed for the same purpose at Rheims is the refuse soap water in which woollen stuffs had been worked to free them

from greasy matters. This water is bought up and brought to the gas works, and being treated with sulphuric acid the fatty matters rise to the surface, and are collected, and finally distilled.—Coal gas, as before remarked, is a mixture of several gases and vapors possessing very different illuminating powers; their relative proportions in different specimens of the mixture are also very variable. The chief ingredient is the light carburetted hydrogen, which has little or no illuminating power, and may be compared to nitrogen in the atmosphere in considering the adaptation of this æriiform mixture to respiration, while the active ingredient in the air or breath (oxygen) finds its counterpart in the light-giving olefiant gas and the rich hydrocarbons of unknown number, which add their vapors to increase the illumination. Light carburetted hydrogen, when free from carbonic acid, nitrogen, and other foreign matters such as usually accompany it, consists of carbon 75 and hydrogen 25 parts in 100. Its symbol is sometimes given as  $\text{CH}_2$ , and sometimes  $\text{C}_2\text{H}_4$ , the proportions of the elements in these being the same; but it is supposed by some chemists that 1 volume of the compound consists of 1 equal volume of carbon vapor and 2 of hydrogen, and by others of 2 of the former and 4 of the latter condensed into the same bulk. Hydrogen and carbonic oxide ( $\text{CO}$ ) are also present in coal gas, and, like the carburetted hydrogen, act the part of diluents. Olefiant gas consists of 86 parts of carbon and 14 of hydrogen, and is expressed by the formula  $\text{C}_2\text{H}_2$ , or, as adopted by some,  $\text{C}_4\text{H}_4$ . The same volume contains double the quantity of carbon that is found in light carburetted hydrogen. Its specific gravity is 0.985, while that of the last-named gas is 0.559, air being 1.000. Other hydrocarbons which yield vapors to the gas are all represented by the same general formula  $\text{C}_x\text{H}_y$ , their difference of character resulting from the different degree of contraction which the volumes of the elements undergo in combining. This appears to constitute the only difference between substances, some of which are exhibited in gaseous, some in fluid, and some in solid form; and it also accounts for the remarkable instability they all display. Some of these hydrocarbons, the vapors of which are found in coal gas, contain double the amount of carbon in a given volume that belongs to olefiant gas, and consequently possess twice the illuminating power, this being proportional to the amount of carbon, as the life-supporting power of the atmosphere is proportional to the quantity of oxygen present. But neither of these active constituents can be added indefinitely to illuminating gas or to the air without defeating the useful effect. Too much carbon involves imperfect combustion, and the richer vapors are more advantageously consumed when dispersed through a body of comparatively inactive gases. The peculiar action of those which perform this office of diluents deserves attention. Carburetted hydrogen in combustion consumes twice its volume of

oxygen, generates its own bulk of carbonic acid, and one cubic foot produces heat sufficient to raise the temperature in a room of the capacity of 2,500 cubic feet from  $60^\circ$  to  $80.8^\circ$ . Carbonic oxide consumes half its bulk of oxygen, generating its own bulk of carbonic acid, with heat sufficient from the combustion of one cubic foot to raise the temperature of the above amount of air from  $60^\circ$  to  $66.6^\circ$ . Hydrogen consumes half its bulk of oxygen, generates no carbonic acid, and one cubic foot produces heat sufficient to raise the temperature of the given amount of air from  $60^\circ$  to  $66.4^\circ$ . To produce therefore the least heat with the least vitiation of the air of the room, hydrogen is the preferable diluent. In what is known as White's hydrocarbon method of gas-making, it was supposed that the production of the most perfect mixture was approximated. The illuminating constituents are generated in as concentrated a form as possible in one retort, and the diluents, consisting principally of hydrogen, free from light carburetted hydrogen, in another. The diluents are conducted so rapidly through the retort in which the production of the illuminating gases is going on, that they are swept forward before they can be decomposed by the action of the red-hot surfaces of the retort. In this way, as stated by Dr. E. Frankland in communicating these facts to the royal institution, London, coal is frequently made to produce an increase of 200 to 300 per cent. over the usual quantity of gas, and this of 50 to 100 per cent. greater illuminating power. For some reason, however, probably the skill and care required to conduct the process, the operation has not been successfully adopted.—The quantity and quality of gas obtained from bituminous coal vary greatly with the character of the coal itself, and also with the manner in which the distillation is conducted. A poor kind of coal will not make good gas; and a large yield may be no recommendation of the process employed. Cannel is the variety of coal preferred both for the quantity and quality of the gas it affords. It is exported from England to the United States for this use, and also to Berlin. Some of the mines in Virginia and the western states furnish excellent varieties of this fuel. Where it cannot be had, the richest caking coals are used, and are probably more employed than the cannel. A ton (2,240 lbs.) of good cannel coal yields in large operations about 10,000 cubic feet of gas; and 9,000 to 9,500 feet is considered an average product from Newcastle and other good caking coals. A pound of good coal may be regarded as yielding 4 to  $4\frac{1}{2}$  cubic feet of gas. Some still more volatile coals have been found even better adapted for gas manufacture than the cannels before known. Such are the Boghead cannel, found between Edinburgh and Glasgow, which is said to produce 18,500 feet of gas per ton, of specific gravity 0.775, and the so called Albert coal of New Brunswick. (See COAL.) In submitting the coal to the action of heat in close



retorts, which may be of cast iron or of clay, the first substances evolved are steam and atmospheric air. The former is an objectionable product for several reasons, and the coal should consequently be kept as free as possible from moisture before it is used. The conversion of water into steam absorbs a portion of heat, and serves to keep down the temperature in the retort, causing the evolution of tarry matters, which at a higher temperature would have been converted into gas. The steam also is liable to be decomposed in coming in contact with portions of the fuel heated to redness, and its oxygen thus unites with proportionate quantities of carbon, producing carbonic acid and carbonic oxide, and thus robs the coal of a part of its chief gas-producing elements. The hydrogen set free passes over uncombined with carbon. While the retorts are at a low red heat the ingredients of the coal tend to form chiefly tarry matters, and with them come over aqueous and ammoniacal vapors and sulphurous acid. The ammoniacal product derives its nitrogen from the atmospheric air contained in the retorts, and as it comes over unites with the sulphurous acid. A portion of the sulphur of the pyrites present in the coal unites with hydrogen, forming the gas sulphuretted hydrogen, and a portion uniting with carbon forms the very injurious product sulphuret of carbon. The numerous oily compounds, exceedingly rich in carbon, are also produced, which remain in part with the tar, and in the form of vapor also mix with the carburetted hydrogen and olefiant gas, which are at the same time evolved, adding largely to the illuminating property of the mixture. At a full red heat the gaseous mixture sought for is almost exclusively produced; and it is therefore an object to bring the contents of the retorts as rapidly as possible into this condition to avoid their being wasted by their elements forming comparatively useless compounds. The retorts are for this reason not allowed to cool when discharged of the coke residuum and recharged with fresh coal. In the old practice of 8-hour charges it was estimated that in the first hour of the operation 20 per cent. of the whole product of illuminating gas was obtained, and in each succeeding hour the following proportion: 2d, 15 per cent.; 3d, 14; 4th, nearly 13; 5th, 12; 6th, 10; 7th, 9; 8th, 8. The gas at first has but little illuminating power. It is the best in the early part of the process, while the coal is becoming thoroughly heated, its specific gravity then being 0.650, after which it gradually falls to about 0.845 at the close of the operation. At 8 different stages of the distillation continued for 10 hours the mixture has been found to be in 100 measures as follows: 1st, carburetted hydrogen 82.5, olefiant gas 18, carbonic oxide 8.2, nitrogen 1.8—sp. gr. 0.650; 2d, at 5 hours, carburetted hydrogen 56, olefiant gas 7, carbonic oxide 11, hydrogen 21.8, nitrogen 4.7—sp. gr. 0.5; and at the close of the operation olefiant gas had disappeared, carburetted hydro-

gen was 20, carbonic oxide 10, hydrogen 60, nitrogen 10—sp. gr. 0.845. Though the presence of any of these ingredients is not regarded as impairing the technical purity of the gas, its quality for illuminating purposes is greatly affected by the different proportions in which they are found; and by continuing the operation too far it is obvious that the proportion of non-illuminating compounds rapidly increases. Sulphuretted hydrogen is especially apt to make its appearance, and become intermixed in the last stage of the process, seriously affecting the purity of the mixture. Other substances which contaminate it are the vapors of water and ammonia, formed in the first part of the operation, and which should be condensed and separated in the tar receiver, and also carbonic acid and sulphurous acid gas. At high temperatures the retorts become coated with a dense carbon of excessive hardness, which is supposed to be deposited from gaseous carbon separated from light carburetted hydrogen, hydrocarbon vapors, or from olefiant gas, as these are decomposed in passing over very hot surfaces. The latter gas may be made to yield up a portion of its carbon in this form by conducting it through red-hot tubes, and the volatile hydrocarbons are known to be similarly affected. High temperature is therefore injurious from its tendency to decompose the most valuable products of the distillation, and reduce the substances to their elementary condition or simple combinations nearly approaching it. The methods in use, however, for effecting the decomposition of carbonaceous compounds, which produce illuminating gas, do not admit of the complete regulation of the temperature which a perfect operation would require; and there is hence a necessary waste of gas in the manufacture and uncertainty as to its exact composition. The duration of the process is now generally reduced to from 4 to 6 hours, depending upon the kind of coal and size of the retorts, and the richest gases are evolved during the first hour. In Scotland the rich cannels are sometimes carbonized in 8 hours. By practice and careful attention to the qualities of the materials employed, manufacturers succeed in producing at the same works an article not varying greatly in composition; but the gas of different establishments is found to be of very different qualities. Its value is estimated by referring it to some standard with which the illuminating power of a given quantity is compared by actual trial. Five cubic feet of gas are commonly consumed in an hour by an Argand burner, and the light is compared by means of suitable instruments with that of spermaceti candles, each burning 120 grains in an hour. The gas of the London works varies with the coals employed, from an illuminating power of 11.5 to 18 candles, the best results being with varieties of cannel, which also commonly afford a few hundred feet more of gas per ton. The range at these works in variable amount of product rarely exceeds 1,000 cubic

feet to the ton of coal, or about one-tenth of the whole product. The greatest specific gravity (about 5.30) is that of cannel coal, producing the greatest quantity of gas and of highest illuminating power. This property therefore may be conveniently appealed to as an auxiliary test of the comparative qualities of different gases. The presence of impure heavy gases, or even of atmospheric air, would, however, by increasing the figures, lead to a false estimation of the value of the gas, unless other tests were resorted to. These may be organic analysis, determination of carbon by the amount of carbonic acid produced by explosion with oxygen, or the direct determination of the proportion of olefiant gas and hydrocarbon vapors present in the mixture by the condensation produced in it by the introduction of chlorine, bromine, or sulphuric acid—substances which have the property of absorbing and forming fluid compounds with those highly carburetted bodies on which the value of coal gas depends. The gas of the Liverpool works is far superior to that of London; it is sometimes found equal to 22 candles. The New York companies very seldom make 20 candle gas, but their product is usually about 16 candle. The Manhattan company use from  $\frac{1}{2}$  to  $\frac{3}{4}$  cannel coal. The Boston company uses about  $\frac{1}{4}$  cannel. The following table presents the production in gas of the best foreign coals, with the specific gravity and weight of the gas to the ton of coal. The authority

for Nos. 1 and 2 is a parliamentary return; 8 and 12, Dr. Fyfe; 4, 5, 6, the British "Journal of Gas Lighting;" 7, 10, 11, 19, 20, Mr. Clegg; 8, 9, 14, 15, 16, Mr. Joseph Hedley; 13, John Kay, of the Dundee gas works; 17, 18, 21, Mr. J. Evans.

Description of coal.	Cubic ft. of gas per ton.	Specific gravity of the gas.	Wt in lbs. av. per ton of coal.
<b>NEWCASTLE COALS.</b>			
1. Leeds coal .....	6,500	.580	268
2. Derbyshire soft coal .....	7,000	.448	240
3. English caking coal .....	8,000	.420	257
4. Washington coal .....	10,000	.480	330
5. Dean's Primrose .....	10,500	.480	347
6. Pelton .....	11,000	.480	368
7. Felling main .....	11,200	.410	361
8. Blenkinsop, Carlisle .....	11,200	.581	447
9. Newcastle coal .....	11,648	.675	428
10. Russell's Wallsend .....	12,000	.418	384
11. Pelaw main .....	12,400	.420	399
<b>CANNEL COALS.</b>			
12. Scotch parrot .....	9,500	.640	466
13. Ramsey's Newcastle cannel .....	9,233	.598	437
14. Washington cannel .....	10,500	.500	408
15. Leamhagow cannel .....	11,212	.787	638
16. Pelton cannel .....	11,500	.580	459
17. Arncliffe cannel .....	12,600	.626	606
18. Knightswood cannel .....	12,200	.550	558
19. Scotch cannel .....	14,000	.580	623
20. Wigan cannel .....	14,458	.640	708
21. Boghead cannel .....	15,000	.759	866

The following table by Mr. Wright presents in another form the proportions of the other ingredients also which are obtained in the distillation of coal:


Ingredients (lbs. per ton).	Leamhagow cannel.		Ramsey's Newcastle cannel.	Derbyshire deep main.	Wemyss's cannel.		Wigan cannel.
	Ex. 1.	Ex. 2.			Ex. 1.	Ex. 2.	
Coke .....	1061.0	1064.0	1485.00	1885	1194.5	1,183	1296
Gas .....	458.0	458.5	410.00	800	551.4	523	388
Tar .....	594.0	608.0	395.00	219	224.0	197	250
Ammonia and water .....	4.5	4.5	6.72	179	...	...	...
Loss .....	87.5	85.0	98.28	207	840.1	837	826
Total .....	2240.0	2240.0	2240.00	2240	2240.0	2240	2240
Cubic feet of gas .....	11,681	9,878	9,016	9,400	10,976	10,192	9,408
Specific gravity .....	0.540	0.650	0.604	0.624	0.670	0.691	0.478
Illuminating power, gas of sp. gr. 0.861 being 1 .....	...	2.88	3.0	0.8	2.47	...	1.5

The product of coke is usually estimated at about 2 bushels to the cwt. of coal; and about  $\frac{1}{2}$  of the whole product is consumed for heating the retorts. The coal tar is also in part consumed for the same purpose; but its principal use has been for the preparation of a paint, which is much employed for coating iron work exposed to the weather. Of late it is largely distilled to obtain from it coal naphtha and coal oil. The pitch which remains as a residuum is used to pay the bottoms of vessels, &c. —**GAS MANUFACTURE.** Supplies of gas are furnished to cities and towns by chartered companies, which provide extensive manufactories, and lay under the streets the cast iron pipes for conveying the gas to any distance required. The works, varying in extent according to the demand for their product, are constructed upon the same general plan. In selecting a suitable location for them, the chief objects sought for are convenience in supplying the materials required,

and a spot where the products of the operations escaping from the works can do no serious injury to neighboring property. The process, as carried on in these works, is analogous to the combustion of candles for the production of light. The capillary tubes of the wick, in which the liquefied wax or tallow is decomposed by heat and produces the inflammable gaseous matters, correspond to the retorts in which the coal is decomposed. The long iron pipes are extensions of the tubes of the wick, at the extremities of which the gases are ignited. In the one case, however, the combustion of the gases as produced affords the heat for effecting the decomposition of fresh portions of the material that generates them; while in the other the combustion is at distant points, and a separate fire is required to effect the decomposition. In gas works the first objects of interest are the retorts. These are commonly made of cast iron, but others of fire clay are extensively used in

England, and by many are considered decidedly superior to those of metal.\* The iron retorts are made of various forms—plain cylinders 7 feet long and 1 foot diameter, also of oval cross section; and again of the same modified by the bottom being bent in toward the centre, giving to the cross section a kidney or ear shape; but the last, which were formerly in high favor, are now entirely out of use. The kind generally preferred at present is the so called D-shaped retort, its cross section having the shape of this letter, with the flat side for the bottom. They are from 7 to 9 feet in length, from 1 to 2 feet in width, and from 12 to 15 inches in height. Many works use what are called "through retorts," which are from 16 to 18 feet in length. These are charged at each end. Experienced engineers regard them as the most economical. Retorts are set in groups of 3 to 13 in each furnace. In large establishments the furnaces are double stacks, 2 single retorts placed end to end or one through retort reaching through, so that the neck or mouthpiece of each projects through the exterior wall; the fire places under the retorts also open out on either side, and the flues from all of them unite in one along the central line of the stack. The retorts are set in the brick work in 2 or 3 horizontal rows, 5 for each furnace with a fire under each of the 2 or 3 retorts of the lower row. The flame from the fires can pass among them all before escaping by the flue. The furnaces succeed each other in the same stack through the length of a large building, the retorts in large establishments numbering many hundred, of which all may be kept in operation in the winter season, and part only in the summer. At the great central gas works in London a new form and arrangement of retorts have been tried within a few years, by which it was thought great economy in consumption of fuel for distilling the coal was effected, together with increased production of gas and other advantages. But after the most flattering reports, the trial does not seem to have been satisfactory, as the company are said to have returned to the old plan. Thirteen retorts were arranged over one furnace fire, set in 2 series, the upper of 6 retorts, 18 feet in length, made of fire clay, only their necks of cast iron pro-

jecting beyond the brick work. The lower set were of iron 19½ feet long, going like those above completely through the stack, and like them they were charged and discharged at both ends. They were heated by the descending current of flame, which had first been led around the earthen retorts. These bear a higher heat, and they also retain it much better, than the iron retorts; they were charged every 4 hours, while the others were charged every 6 hours. The average yield of each retort was 18,500 feet of gas per day. By this arrangement a large number of retorts of great capacity is concentrated in comparatively little room. Clay retorts accumulate little of the solid carbon, which is apt to form a hard lining in the iron ones, requiring them to be frequently cleaned out with great labor. That which collects in the former is easily removed in flakes with a bar on leaving them open at both ends so that a current of air can pass through. An iron retort is estimated to last through the production of 700,000 feet of gas; 6 times this amount has been obtained from a "through" clay retort. All forms of retorts are provided with a mouthpiece, commonly of the same size with the body, to which it is attached by bolts, if the parts are not both in the same piece. This mouthpiece projects in front of the brick work, and the pipe called the stand pipe, usually about 4 inches in diameter, for conveying off the gases, enters through its upper side, and rises 4 or 5 feet up the front of the brick work, then bending back passes down by what is called the dip pipe into the large horizontal pipe laid on the top of the brick work, which is called the hydraulic main, and receives the products from all the retorts in the furnaces beneath it. The retorts are charged with coal by means of a long semi-cylindrical scoop of sheet iron, which being filled, and the old charge being raked out, is pushed into the red-hot retort; by means of the handle it is twisted over so as to empty itself, and is then withdrawn. A charge of 120 to 200 lbs. of coal, about half filling a single retort, is thus introduced at once. Before much gas can escape, the cast iron cover, coated with suitable luting, is brought into place and screwed fast. In discharging a retort the cover is first loosened, and the gas which escapes is ignited. By this means an explosion is avoided, which would be likely to occur if the interior were suddenly exposed to the atmosphere. The coke, as it is withdrawn, bringing with it a large amount of heat, is sometimes used in the furnaces at once with great economy, no time being allowed for the heat to escape. The hydraulic main is about half filled with water or fluid tar, which is made to retain its level by a discharge pipe suitably placed. Into this the dip pipes penetrate about 3 inches; and the aeriform fluids, pressed forward from the retorts, readily pass up through the denser fluid to the reservoir above, but are prevented by it from turning back through the pipes when the flow from the retorts is interrupted. The hydraulic main is a very strong pipe of cast or

\* A late paper on clay retorts by Mr. J. Church, read to the London Institution of civil engineers, presents the following facts relating to the comparative quantities of gas made by the two kinds of retorts of the  form, of 15 inches by 18 inches in section, and 7½ feet in length. Iron retorts lasting 865 days, and working off 1½ cwt. of coal for each charge, effected the carbonization of 2,190 cwt. of coal, which at 3,000 cubic feet of gas per ton gave a total quantity of 985,500 cubic feet of gas per retort; while the clay retorts lasted 919 days, carbonized 5,478 cwt. of coal, which at 3,000 cubic feet of gas per ton gave 2,462,000 cubic feet of gas per retort. It will thus be seen that the clay retorts yielded a greater quantity of gas from the same weight of coal than the iron retorts; but the specific gravity of the gas thus made was less, and its illuminating power was diminished in consequence of the increased temperature of the clay retorts, which caused the last portions of the gas to be decomposed. Clay retorts in large establishments are best worked with the addition of an exhaustor. The pressure is thus reduced, and the gas not escaping through the pores, the quantity is increased about 300 cubic feet per ton of coal. In small works, the exhaustor would not save the expense of its introduction, requiring as it does steam power to work it.

of boiler plate iron, often a foot and a half in diameter, placed exactly level, and extending the whole length of the furnace stacks. It serves to collect a large portion of the tar and ammonia; but a part is kept by the heat in the state of vapor, and is carried along with the gas. To separate this, the mixture is cooled by passing it through a series of tall condensing pipes of iron placed in the open air, and sometimes kept cool by water made to trickle down their outside surface. The gas goes up one and down another in succession. At the bottom of each pair a pipe communicating with a cistern in the ground conveys to this the tar and ammonia which separate from the gas. From the condensers the gas in some works passes into the bottom of a large tower nearly filled with paving stones or coke, and having a contrivance at the top for sprinkling a fine shower of water in the space above the contents. After rising up into this space, the gas, deprived of still more tar and ammonia, passes down by a pipe which leads under the tower and terminates in the bottom of another similar one close by, discharging the gas among the stones or coke. From the top of this it is conveyed down again by a large pipe which passes under ground to the next apparatus. The towers are called scrubbers; the sprinklers at the top consist of hollow cross-arms perforated with small holes and kept revolving by steam power. The passage of the gas through different parts of the apparatus is continually subjected to increased resistance, which is all turned back upon the retorts. The weight of the gas holders at the end of the series adds largely to this pressure. The effect of it is found to be a proportional increase of the carbonaceous deposit in the retorts; and this causes them to burn out rapidly, and moreover is produced, it is believed, at the expense of the most valuable light-producing vapors. In the use of clay retorts the gas is even forced by the pressure through the porous material. The gas obtained is also of poorer quality by reason of the pressure; and the materials tend to produce a large proportion of tar. To obviate these injurious effects an apparatus has been introduced within a few years, called the exhauster, which, placed next to the scrubber, pumps up the gas and forces it along. A highly approved form in use at Liverpool is an oscillating machine of the plan of the *ventilateur du Hart*, described at the end of the article *BLOWING MACHINES*, to which reference may be made for its description. In New York a revolving exhauster is employed on the plan of that of Jones of Birmingham or Beales of London. The next operation is to separate from the gas the mixed sulphuretted hydrogen and carbonic acid; also any ammonia that may be present (if the scrubber apparatus has not been used), combined with either carbonic, hydrochloric, sulphurous, or sulphuric acids. For this purpose the mixture is passed into either the wet or dry lime purifier. In the former it is distributed under a surface of lime water, or milk

of lime, so as to bubble up through the liquid, which at the same time is stirred by a rapidly revolving arm. Provision is made in some machines for drawing off the old liquid and supplying fresh portions, as the lime is exhausted by combining with the chlorine and hydrosulphuric acids. But a better method is to employ two pairs of machines, and, as the lime in one becomes spent, replace them with the other. The proportion of lime required varies of course with that of the sulphuretted hydrogen and carbonic acid present. As a general allowance, a bushel of quick lime mixed with 48 gallons of water should, if properly applied, purify 10,000 cubic feet of gas. The product should be frequently tested to determine its purity. This is done by presenting a piece of paper moistened with solution of acetate of lead to a jet of the escaping gas. If it becomes discolored at all, the gas is impure. The dry lime purifier consists of an iron box, until recently about 6 feet in length, 5 in breadth, and 8 in depth, but now sometimes 25 feet square, arranged with several shelves, one above another, of iron grating, which are covered with lime to the depth of about 3 inches. Movable trays are conveniently substituted for the shelves. The lime is sprinkled with water to slake it. The gas, let in below through a large pipe, passes up through the lime, which combines with and retains its impurities, and the gas is then conveyed away by another pipe. The French arrange the slaked lime upon trays in layers with moss, which serves to divide the gas into minute jets and multiply the points of contact with the lime. They spread among the moss a little less than a bushel of lime to the square yard of surface; and they use about  $2\frac{1}{2}$  bushels to a ton of coal, the average product of which is less than 7,000 cubic feet of gas to the ton. The purifier is of circular form, and the rim of the cover shuts down into a ring containing water, thus making a gas-tight joint, while the cover can be moved on and off with perfect freedom. The dry lime purifier is generally preferred to the wet lime; the passage of the gas is less obstructed, and the product is less offensive to the neighborhood. By connecting the interior of the purifier by means of a large pipe with the flue of the chimney, the current of air allowed to enter draws up the offensive gases from the lime, and they are decomposed in the hot air of the chimney. This would seem to be a hazardous process, endangering explosion. Tomlinson refers to it, but we have only known the foul gases to be conducted to flues unconnected with fires, or pumped out and passed through copperas to decompose them. The cover of the purifier being raised, the lime can be taken out without causing any annoyance; and it is then sometimes burned in ovens and afterward used a second time, but the common practice is to throw it away after once using.—From the purifier the gas is conducted to the station meter, the instrument for measuring and registering the quantity produced

during any period of time. It is constructed upon the principle of the meters used by each consumer, but on a much larger scale. A cylindrical box more than half filled with water contains a drum supported upon an axis which passes from one end to the other of the outer case. This drum is divided into 4 hollow compartments, each of which has an opening into the central space around the axis, and also slits in the rim communicating with the space next the outer case. The gas is conducted into the central space and flows into one of the partially submerged compartments. As this fills, the pressure of the gas causes the drum to begin to revolve, and as it passes round the next compartment comes in position to be filled, and so on, each chamber as it is submerged in its revolution discharging its measure of gas into the space above the water next to the outer case, from which it is conveyed away to the gas holder. The capacity of the chambers being known, and the number of revolutions recorded by a train of wheel work connected with dials on the outside of the case, the whole quantity of gas passed through is at any time seen. But to give uniform results the water must always be at the same level; as it rises it diminishes the gas capacity of the compartments, and as it sinks it enlarges this, and more gas is passed with each revolution. The station meters are also provided with a clock, to the minute hand of which is attached an index carrying a pencil. By the lines this traces upon a disk of paper attached to a plate which is affixed to and revolves with the axis of the drum, any irregularity in the supply, and the time of its occurrence, are registered. The dials are provided each with a single pointer; one marks the number of tens of cubic feet, another the number of hundreds, another thousands, &c., up to tens of millions. The largest instruments of the kind pass about 650 cubic feet in one revolution of the drum, and register in an hour about 70,000 cubic feet.—The next apparatus is the gas holder or reservoir. It is a cylinder of plate iron suspended or floating with its open lower end in a cistern of water. As the gas is admitted beneath, the cylinder is lifted up by it; and as it is required for consumption, the pressure of the gas holder forces it through the pipes laid for its conveyance. These receptacles are of immense size for the supply of large cities. One in Philadelphia is of the capacity of more than 1,000,000 cubic feet, being 140 feet in diameter and 70 feet high. The imperial gas company of London have one 200 feet in diameter and 100 feet high. To obtain room for gas holders of great height to descend, so that their tops may come down to the level of the water, and the gas be all expelled from them, they are made in sections which shut one within another like the parts of a telescope. The lower edge of each section except the lowest curves up in a flange directed outward, and forming a ring. As the section rises out of the water this ring comes up filled with it, and

catches the flange of the next section below, which is bent inward for this purpose. The water has the effect of making the joint proof against the escape of gas.—Between the gas holder and the main pipe is placed an apparatus called the governor, contrived to regulate the pressure of the gas as it is admitted into the main; and it is found useful to repeat these machines wherever the gas is distributed at points varying considerably in elevation, as from its low specific gravity the pressure increases with the elevation, the rate being  $\frac{1}{10}$  of an inch for every foot of difference of height. It has even been recommended to use one for every 80 feet of rise in the ground through which the pipes are carried. In construction it resembles a gas holder, an inverted cylinder being suspended with its lower part in water so that as the gas comes in from below the upper portion is lifted. This carries suspended from its centre a cone of cast iron, turned true, and adapted when raised sufficiently high to fit closely the bevelled opening by which the gas enters the central part of the apparatus. The outlet pipe commences in the upper portion and passes down through the bottom. The cone and cover are nearly counterbalanced by a weight, which passes over a pulley outside of the machine. When the pressure of gas is moderate the cover and cone descend, leaving a wide opening for the gas to enter. When the pressure increases the cone rises and checks the flow.—The gas, being now delivered into the main, is distributed to the various points where it is consumed. Each customer is furnished with his own meter, which registers on the principle explained the quantity he consumes. Small pipes convey the gas from the meter to the various burners affixed at their terminating points. Upon the form and condition of these the economical consumption of the gas in proportion to the light produced in great measure depends. Each one is furnished with a stop-cock upon its own supply pipe, and by means of this the quantity admitted to the burner is regulated. The opening at the end for the gas to escape is often in the form of a narrow slit. This gives to the flame the form of a thin sheet known as the bat's wing; and a similar effect is produced by two small round holes in the end of the burner inclined toward each other. The principle of the Argand burner is explained in the article ARGAND LAMP. In applying this principle to gas, the burner is a hollow ring perforated with holes about  $\frac{1}{4}$  of an inch apart, and measuring  $\frac{1}{2}$  of an inch in diameter, bored with the greatest accuracy. These are large consumers, but give a brilliant light; and in most burners this is attained at the expense of an unnecessary quantity of gas. Economy in this respect and a flame free from flickering have been most important desiderata in the construction of all new burners, of which there is the greatest variety. No burner in use appears to combine these advantages so admirably as that known as "Gleeson's American gas burner,"

comparative experiments with which, made by Prof. Silliman, jr., gave the most favorable results, a 3 feet burner giving under 14 inches pressure light equivalent to that of 16 candles. The writer has found it preferable to many other burners tried with especial reference to long continued use as a study light. Very economical and cheaply constructed burners are those of Mr. E. L. Hicks of New York, the peculiarity of which consists in a metallic cap or thimble provided with a circular aperture in the top. This is fitted to slip over an ordinary burner, and when in its place the light from the same flow of gas is perceptibly increased. As measured by the photometer, this increase has been found, according to the experiments of Prof. John Torrey, to amount to 74 per cent. as a minimum, with a 3 feet fish tail burner, to a maximum of 206 per cent. with a 2 feet burner; thus more than trebling the light. The effect seems to be analogous to that produced by placing a thin platinum slip in the flame of a lamp, and is probably owing to a check produced in the consumption which causes the particles of carbon to become incandescent before they enter into combination with oxygen. As the pipes are liable to become foul by oxidation, especially between the burner and the stop-cock, where air mixes with and aids to decompose the changeable compounds contained in the gas, attention should be directed to keeping them clean, and instruments are sometimes furnished by the gas companies for this purpose. Burners of soapstone have recently been introduced in Nuremberg, Germany. They have the advantage of not being affected by the chemical action of gases, nor by high degrees of heat, such as burners are sometimes subjected to in laboratories. The stone is cut into slabs which are exposed in hermetically sealed cases to heat very gradually raised to redness. In two hours they are slowly cooled, then turned to proper shape in a lathe, and boiled in oil, till they become deep brown. On drying they are polished with a woollen rag. The boring requires much care and skill.—A common trouble with gas pipes in severe cold weather is their "freezing up," thus interrupting the flow of the gas. This is owing to the vapors which accompany the gas condensing, and unless the pipe descends toward the meter, flowing back and obstructing the pipe. This often occurs when the pipe is laid so deep as to seem out of the reach of frost. A simple remedy is to give the pipe a slope toward the meter.—In the use of gas several circumstances are to be considered which affect the estimation in which it is held. Though unquestionably more economical than any other means of producing the same quantity of artificial light, it is commonly used so freely that often no saving is experienced over modes of illumination previously in use. No one is satisfied with an amount of light from gas which was sufficient when furnished by the troublesome oil or candles. From this freedom in consuming it gas tends also to give out much heat and to vitiate the air. Yet, according to the statements

of Dr. Frankland, gases producing light equal to 20 sperm candles generate carbonic acid in the ratio, as compared with these candles, of 5 to 8.3, and heat in nearly the same proportion, and with the best hydrocarbon gases the ratio was, of carbonic acid 2.5 to 8.3, and of heat 19 to 82. Wax was rated with sperm, while tall-oil candles equal to 20 sperm generated 10.1 of carbonic acid and 100 of heat. The effects of the heat and of the vicious air may be remedied in great part by the adoption of a system of ventilation, placing over each burner a hood and pipe for conveying to the nearest flue above the products of combustion. In low rooms this may be desirable, and especially in the use of gas that has not been thoroughly deprived of sulphurous acid.—PORTABLE GAS. Methods have recently been introduced of taking supplies of gas in steamboats and on railroad cars, and renewing these as they are consumed. By one plan sheet iron cases of the capacity of 50 or 60 feet are fitted under the cars and filled as occasion requires from the street mains under ordinary pressure. The tops of the cases are lined with a loose sheet of India rubber, which swells upward as the gas flows in beneath. To expel the gas for use, air is forced in above the lining by the action of a meter running by clock work under uniform pressure. The clock work is impelled by a spring which is wound up by hand, and the action is suspended whenever the valves for the burners are closed. The motion of the cars does not affect the regularity of the supply to the burners. From the permeability of all flexible sheets, this process cannot be regarded as entirely safe from danger of explosion. By the method of the New York car and steamboat gas company the gas is first compressed by a force pump into strong cylindrical gas holders made of boiler plate iron, and measuring 7 or 8 feet in length by about 14 inches in diameter. By the pressure of 20 atmospheres 100 feet of gas is thus put into a space of 5 cubic feet. To secure a uniform rate of discharge when the cylinders are connected with the gas pipes of the car or steamboat in which they are carried, a regulator of improved form is attached to the pipes, by which the aperture through which the gas passes is gradually made to enlarge with the diminution of pressure. In Jersey City a stack of cylinders connected by small pipes serve as a reservoir, into which the gas is pumped at a pressure of about 450 lbs. From this a pipe extends to the railroad station, a quarter of a mile distant, and as the cylinders attached beneath the cars require a new supply, they are simply connected with this pipe and directly filled. The same plan is also applied of late to furnishing houses with gas that are situated at a distance from the public gas pipes.—GAS AS FUEL. Within a few years gas has been applied in stoves constructed for the purpose to furnish heat by its combustion; and being so perfectly under control and directed so readily to produce the required effect, it has in many circumstances proved an economical fuel.

In summer it may be made to heat in suitably arranged apparatus culinary and other vessels without materially adding to the warmth of the apartment; while in winter, consumed in stoves adapted for diffusing heat, it has been made to take the place of other fires, and the application is especially convenient where a fire is only occasionally required a little while at a time. Thus employed, particular attention should be directed to ventilation, the importance of which is liable to be overlooked, as the deleterious gases largely produced do not make their presence directly sensible. In chemical laboratories gas has long been applied to this use. It has been found particularly convenient for heating small crucibles, and by directing through the Argand burner in which it was consumed an annular concentric current of air, intense heat has thus been attainable at any moment, and without loss by its dispersion to other objects. It then came to be applied in many of the mechanical arts, and upright cylindrical stoves of sheet iron were contrived in which the gas, being ignited, heated by its combustion the tools placed for the purpose in the upper part of the stove. The flame is sometimes that of a number of small jets, applied directly to the object to be heated, and in other arrangements the gas is discharged beneath a diaphragm of wire gauze which is placed across the upper part of an upright cylinder of sheet iron. Air also is let in below and mixes with the gas before passing through the wire gauze. Being ignited above, the flame cannot pass down through the gauze into the cylinder. The mixture of a suitable proportion of air serves to add to the intensity and heat of the combustion, but lessens the illuminating power of the gas, which now burns with a blue instead of a yellow flame. This is probably owing to the carbon and hydrogen both simultaneously combining with oxygen furnished by the air disseminated through the gas, while in the ordinary manner of effecting the combustion the hydrogen first burns, and the particles of carbon are made incandescent and luminous before they find their equivalent of oxygen. Small cylinders have sometimes the gas introduced together with a portion of air, the one by a jet and the other by openings made at the base of the cylinder, and the combustion is effected and kept up at the top without the intervention of the wire gauze.

—GAS IN THE UNITED STATES. The first attempts to introduce the use of gas in the United States were at Baltimore, by some accounts in 1816, and by others in 1821. They appear to have been unsuccessful. In 1822 it was introduced into Boston; and in 1823 the New York gas light company was incorporated with a capital of \$1,000,000, but did not enter into successful operation till the year 1827. In 1830 the Manhattan gas light company was incorporated with a capital of \$500,000, which has since been increased to \$4,000,000. The former supplies that portion of the city below Grand street, having 188 miles of pipe laid, of diam-

eters ranging from 4 to 18 inches. It has 3 retort houses, containing 504 retorts and over 160 furnaces; and 6 telescopic gas holders, beside 6 distributing gas holders at different points of its district. The company employs about 400 men, and manufactures 430,000,000 cubic feet of gas per annum. Until the year 1849 rosin and oil were used for producing gas; but the materials generally employed are 2 parts of cannel coal and one of Newcastle. The Albert coal of Nova Scotia, referred to in the article COAL, has lately come into use. It is estimated that a chaldron of the best cannel coal, weighing 27 cwt., makes 12,000 cubic feet of gas; and the Newcastle coal 8,650 feet, beside 14 cwt. of coke, 12 gallons of tar, and 1½ of ammoniacal liquor.—The Manhattan gas light company supplies the streets between Grand and 79th streets. It has 207 miles of pipes laid, of diameters varying from 8 to 20 inches. In 1858 it made 725,821,000 cubic feet of gas, and supplied 25,000 private consumers and 8,600 street lamps. The works, situated on 14th street, East river, and 18th street, North river, embrace 5 retort houses, containing 1,900 retorts and 14 telescopic gas holders, of the aggregate capacity of 4,089,000 cubic feet. The quality of the gas is determined by daily photometric observations at the corner of Irving place and 15th street. The annual consumption of gas coal is 76,000 tons, and 200,000 bushels of hydrate of lime are used for purifying the gas. The number of clerks and men employed is 1,500.—The operations of the Philadelphia gas works belonging to the city are given for 7 years succeeding 1840 by Prof. W. R. Johnson in the American edition of Knapp's "Chemical Technology." The results for 1846 and 1847 are as follows:

Statistics.	1846.	1847.
Cubic feet of gas manufactured...	75,454,000	91,457,000
Bushels of coal of 75 lbs. each carbonized during the year.....	284,108	285,117
Barrels of rosin of 250 lbs. each used with the coal during the year...	4,692	6,545
Sum of the weights of coal and rosin used in the retorts during the year .....	18,738,225	22,020,025
Proportion of rosin to the whole material distilled, per cent.....	6.25	7.10
Cubic feet of gas produced per ton (2,240 lbs.) of the materials distilled.....	9,090	8,899
Cubic feet of gas from 1 lb. of mixed coal and rosin distilled.....	4.02	3.97
Total number of bushels of coke produced during the year.....	810,042	411,535
Bushels of coke produced from 1 bushel of coal.....	1.22	1.44
Bushels of coke used in heating retorts during the year.....	201,821	206,176
Bushels of coke used in heating retorts per ton of the mixed coal and rosin.....	24.1	28.0
Percentage of all the coke produced, used in heating retorts.....	65.0	5.73
Struck bushels of lime used for purifying gas during the year...	61,818	80,508
Cubic feet of gas purified by 1 struck bushel of lime.....	1,290	1,184
Cost of coal per bushel, in cents...	21	17½
Cost in cents of rosin per barrel of 250 lbs.....	75	80
Cost of lime per bushel in cents (in 1843, 2.44).	....	....
Cost of gas made during the year,		

Statistics.	1866.	1867.
exclusive of interest on capital, but including all payments for materials, freights, rents, salaries, wages, repairs, and all incidental expenses of the manufacture and distribution.....	\$121,054.60	\$96,527.43
Cash receipts during the year for gas, coke, lime, tar, &c.....	180,883.08	209,664.76
Price paid for gas per 1,000 cubic feet.....	\$2.60-\$2.50	\$2.50

The use of gas has continued to spread among the chief cities and towns of the United States with great rapidity, especially in the last few years, till the gas interest, it is estimated, now represents a capital of \$34,920,000 in the United States, divided among 237 companies; and in Canada, \$1,040,000, among 6 companies. In New York alone there are 43 cities and towns lighted with gas, and the number of these is constantly increasing. The lowest price anywhere paid for gas is at Pittsburgh, Pa., \$1.50 per 1,000 cubic feet. The highest price, \$7.00, is paid at Auburn and Watertown, N. Y., Belfast, Me., Charlotte, N. C., and some other places. A monthly paper devoted to the interest, was commenced in New York in July, 1859, entitled the "American Gas Light Journal."—The following table presents the general statistics of the production and cost of gas in the principal cities of the United States:

Name of gas light company.	Cubic feet of gas sold per annum.	Price to private consumers per 1,000 cub. ft.	Average cost of coal per ton of 2,000 lbs.
Manhattan, N. Y. . . . .	725,321,000	\$2.50	\$6.50 to 11.00*
New York, N. Y. . . . .	420,000,000	2.50	
Philadelphia, Penn. . . . .	422,000,000	2.18 net	6.50
Boston, Mass. . . . .	200,000,000	2.50	5.00 to 12.00*
Brooklyn, N. Y. . . . .	168,000,000	2.85 net	7.25 to 8.15
Cincinnati, Ohio. . . . .	96,703,900	2.50	5.40
Chicago, Ill. . . . .	86,250,810	2.50	3.78
St. Louis, Mo. . . . .	74,500,000	2.50	7.50
N. Liberties, Phila. . . . .	70,000,000	2.88 net	6.25
Pittsburg, Penn. . . . .	54,720,000	1.50 net	1.25
Providence, R. I. . . . .	41,437,583	3.00 net	7.90*
Albany, N. Y. . . . .	40,250,000	3.00	6.75 to 8.00
Louisville, Ky. . . . .	33,750,000	3.00	
Williamsburg, N. Y. . . . .	33,493,083	3.50	6.25 to 9.50
Troy, N. Y. . . . .	29,000,000	3.60 net	7.90*
Richmond, Va. . . . .	27,000,000	2.95	4.15
Rocheater, N. Y. . . . .	25,000,000	3.00 net	5.38
Lowell, Mass. . . . .	21,000,000	2.75	6.50
Cleveland, Ohio. . . . .	20,000,000	3.00	4.25
Detroit, Mich. . . . .	20,000,000	3.50	5.00
Jersey City, N. J. . . . .	19,234,000	3.00	7.89*
Milwaukee, Wis. . . . .	19,042,560	2.50 net	6.00
Hartford, Conn. . . . .	15,000,000	2.50	8.68*
Winchester, Va. . . . .	15,000,000	4.00	6.40
Manchester, N. H. . . . .	14,000,000	2.50	6.00*
Charlestown, Mass. . . . .	13,587,990	3.50	4.42*
Roxbury, Mass. . . . .	12,000,000	2.50 net	6.00
Columbus, Ohio. . . . .	10,729,000	3.50	4.41
Allegheny City . . . . .	9,905,200	3.00	1.45
Worcester, Mass. . . . .	9,000,000	2.50	6.16
Lawrence, Mass. . . . .	9,000,000	2.50	5.05
Balem, Mass. . . . .	8,718,890	2.50 net	

More complete information about U. S. gas companies may be found in a pamphlet recently published by the Louisville gas company, entitled "The Reply of the Louisville Gas Company to the Report of the Committee on Gas and Water, addressed to the Mayor and General Council of the City of Louisville." It contains a

\* Per ton of 2,240 lbs.

mass of information collected from 91 responses to a circular containing 18 interrogatories addressed to 138 gas companies.

GASCOIGNE, GEORGE, an English poet, born about 1587, died in Stamford, Oct. 7, 1577. He was a spendthrift, was disinherited by his father, served the prince of Orange as a soldier of fortune, and returned to England with a reputation for bravery. A complete edition of his works was published in 1587. His poem the "Steele Glas" is the earliest English satire, and has been highly praised by modern critics. His comedy of "The Supposes" is the oldest extant prose play in the language, and has been supposed to have been used by Shakespeare in the "Taming of the Shrew."

GASCOIGNE, SIR WILLIAM, lord chief justice of England under Henry IV. and Henry V., born in Gawthorpe, Yorkshire, about 1350, died about 1420. During the reign of Richard II. he acquired the reputation of a learned and skilful lawyer, and numbered among his clients Henry of Bolingbroke, who, upon his accession to the throne, appointed him chief justice of the king's bench, a position which he filled with singular ability and intrepidity. An illustration of his courage is afforded in his refusal to sanction the execution of Scrope, the rebellious archbishop of York, on the ground that the lay courts had no jurisdiction over a prelate. That act of his life, however, for which he is best known, was the committal of the prince of Wales for an assault upon him, while sitting on the bench, upon hearing which Henry IV. is reported to have said: "Happy the king that has a judge so firm in his duty and a son so obedient to the law." This anecdote, though considered of doubtful authenticity, suggested to Shakespeare the well known scene (2d part of Henry IV., Act v., sc. 2) in which the young king, Henry V., commends the conduct of Gascoigne on this occasion, and continues him in his office. The retaining of Gascoigne in office, however, was long considered a breach of historical truth, as he was supposed to have died before Henry IV. Recent investigations having satisfactorily shown that he was summoned to the 1st parliament of Henry V., and that he was alive on Dec. 15, 1419, which is the date of his will, Lord Campbell ("Lives of the Chief Justices") concludes that he survived Henry IV. and was reappointed chief justice of the king's bench.

GASCONADE, an E. co. of Mo., bounded N. by the Missouri river, and intersected by the Gasconade river; area, 540 sq. m.; pop. in 1856, 6,900, of whom 46 were slaves. The surface is much broken, and the soil of the hilly portions is poor, but the low lands and river bottoms are mostly fertile. Iron ore is found in abundance, sulphur and saltpetre are obtained, and copper has been discovered on Bourbeuse creek. Within a few years considerable attention has been given to the manufacture of wine. The agricultural products in 1850 were 20,427 bushels of wheat, 190,913 of Indian



corn, 26,269 of oats, and 5,081 lbs. of wool. There were 4 tanneries, 1 grist mill, 2 newspaper offices, 8 churches, and 73 pupils attending public schools. The county is well supplied with water power and timber, and has quarries of limestone and buhrstone. Capital, Hermann.

GASCONY (Fr. *Gascogne*), an old province in the S. E. corner of France, bounded N. by Guienne, E. by the county of Foix and Langue-doc, from which it was partly separated by the upper Garonne, S. by the Pyrénées and Béarn, and W. by the Atlantic (the gulf of Gascony). It was originally inhabited by a population of Iberian blood, received from the Romans the name of *Novempopulonia* or *Aquitania Tertia*, and changed it to that of Gascony about the middle of the 6th century, when it was occupied by the Vascones, a tribe of northern Spain, whom the Goths had driven across the Pyrénées. It was more than once invaded by the Merovingian kings, but was never entirely subjugated until the time of Charlemagne. The supremacy of the French crown being finally established, the country was placed under the direct sovereignty of the duke of Aquitaine. Through the marriage of Eleanor with Henry Plantagenet, Gascony, in conjunction with the whole country which that princess held south of the Loire, fell to the crown of England in 1152. For 300 years it remained under the same allegiance, and returned by conquest to France in 1453. It formed afterward, with Guienne, one of the great governments of that country, and is now divided into the 3 departments of Hautes-Pyrénées, Gers, and Landes.

GASCOYNE, WILLIAM, the inventor of the micrometer, born in England about 1621, killed fighting for Charles I. at Marston Moor, July 2, 1644. The instrument, as constructed by him, consisted principally of 2 parallel wires or metallic plates, capable of being moved, which were placed in the focus of the eye-glass of the telescope. The image was comprehended between these, and by means of a scale for the measure of angles its diameter was determined. Gascoyne used his instrument in various astronomical observations, and in determining the magnitude or distance of terrestrial objects.

GASKELL, ELIZABETH C., an English authoress, born about 1820, is the wife of a Unitarian clergyman residing in Manchester. Her maiden name was Stevenson. Her first novel, "Mary Barton," published in 1848, is a striking picture of the daily life of a large manufacturing town, the materials for which were furnished by her close observation of the social character and condition of the working classes in Manchester. The pathetic power of many of the scenes delineated, the broadly drawn characters, and the literary merit of the book gave it not a little popularity, and Mrs. Gaskell at once took a position among the first writers of fiction of the day. She next became a contributor to "Household Words," one of her longer tales for which, "North and South," was reprinted in 1855, having been preceded

by the "Moorland Cottage" (1850), a Christmas story, and by "Ruth" (1853), a tale of considerable power, and, like all her works, founded on her observation of the habits and privations of the poor. Her more recent fictions are the series of papers entitled "Cranford" and "Lizzie Leigh," republished from her contributions to "Household Words." Shortly after the death of her friend Charlotte Brontë, she contributed a memoir of her to the London "Daily News," and in 1857 appeared her "Life of Charlotte Brontë" (2 vols. 8vo.). Her last work is entitled "Round the Sofa" (2 vols. 8vo., 1859).

GASPARIN, AGÉNOR ÉTIENNE, count, a French publicist, born in Orange, July 4, 1810. He was private secretary to M. Guizot, minister of public instruction, and was afterward employed at the ministry of the interior, and in the department of trade and agriculture. From 1842 to 1848 he was a member of the chamber of deputies. A zealous Protestant, he vindicated the rights of his brethren, and claimed unlimited freedom for evangelical preaching and colportage. He also insisted upon the immediate emancipation of slaves and the suppression of prostitution. On the revolution of February he retired to Switzerland. He has published essays on various questions of philosophy or political economy, such as *Esclavage et traite* (1838); *De l'affranchissement des esclaves* (1839); *Intérêts généraux du Protestantisme Français* (1843). His work *Des tables tournantes, du surnaturel en général, et des esprits* (3 vols.) has been translated and published in the United States.

GASPE, an extreme E. co. of Canada East, bordering on the river and gulf of St. Lawrence; area, 4,063 sq. m.; pop. in 1851, 10,904. It constitutes with Bonaventure co. the district of Gaspé. It has a mountainous surface, diversified by many fertile valleys, and traversed by St. Anne, Dartmouth, and other rivers. The inhabitants are engaged chiefly in the lumber trade, and the whale, cod, salmon, mackerel, and herring fisheries. The settlements are confined almost wholly to the coasts, which are lined with excellent harbors.—GASPÉ, or GASPÉ BASIN, a village and port of entry of the above county, occupying a wide area in the united townships of York and Gaspé Bay South, on the S. side of a harbor formed by Gaspé bay, 496 m. N. E. of Quebec; pop. about 550. It is the seat of an important cod fishery, and has several whaling vessels. In 1851 it contained 1 saw mill, 8 grist mills, and 8 churches. The value of imports amounted to \$53,352, and the exports to \$141,740.

GASSENDI, or GASSEND, PIERRE, a French philosopher, called by Gibbon the most learned of the philosophers and the most philosophic of the learned men of his age, born in Champtercier, a village near Digne, in Provence, Jan. 22, 1592, died in Paris, Oct. 24, 1655. Of an obscure rustic family, his childhood was distinguished by purity and gentleness of character and by astonishing precocity. It is stated that

at the age of 4 he played the part of a preacher and delivered sermons before his youthful companions, and was wont to creep out by night to watch the stars; that at 7 he made ingenious explanations to his playmates of the apparent motion of the moon through the clouds; that at 10 he strikingly harangued the bishop of Digne in Latin, on occasion of a pastoral visitation; and that at 18, already known as the little doctor, he adopted the motto *Sapere aude* ("Dare to be wise"), and composed slight comedies in mingled prose and verse, which were played by him and his associates in noble houses. While receiving lessons from the curate of the village he had been accustomed to pursue also solitary studies by the light of the church lamp. He completed his philosophical course at Aix under Father Fesaye, who declared that he often forgot whether the young Gassendi was his pupil or master; and at the age of 16 was appointed professor of rhetoric at Digne. Being destined for the church, he returned within a year to Aix to study theology, received the degree of doctor at Avignon, obtained a small benefice at Digne, and in 1616 was simultaneously elected to the two chairs of philosophy and theology at Aix, of which he chose the latter. He shared in the rising discontent with the reigning scholastic philosophy, collected many critical notes on Aristotle, and employed his leisure in the study of anatomy with Peiresc, president of the university of Aix, and in astronomical observations with Joseph Gautier, prior of La Valette. Even astrology, which he afterward strenuously combated as a delusion, was now one of the objects of his researches. In 1622 he resigned the professorship in order to devote himself more entirely to study. In 1624 he published at Grenoble his *Ezer-citationes Paradoxice adversus Aristotelism*, in which, while professing his faith in the church, he distinguished two things which till then had often been deemed inseparable, the church and the scholastic philosophy. The work attracted much attention. Gassendi had designed to complete it in 5 books, but did not continue it beyond the first two, being reminded perhaps of the fate of Ramus and Giordano Bruno by the opposition which he met, and by a decree of parliament forbidding any opinion to be held or taught contrary to the ancient and approved authors. In the same year he was appointed provost of the cathedral of Digne, but the appointment was contested, and not finally confirmed till 10 years later. For the purpose of forming friendships with the literati of the age, he travelled through Provence and Dauphiny, resided a year in Paris, and began a correspondence with Galileo, in a letter to whom he expressed his concurrence with the Copernican system. On returning to Digne he continued his ecclesiastical duties and various studies, preaching frequently and with great success. In 1628 he visited Paris, travelled with Lullier in the Netherlands, and wrote, at the instance of Mersenne, a lively treatise (1630)

against the mystical and alchemistic doctrines of Robert Fludd. He was a constant correspondent of Kepler, who before his death had publicly announced that Mercury and Venus would pass over the disk of the sun on Nov. 7, 1631. Gassendi was the first to observe the passage of Mercury, and wrote a minute account of the phenomenon. On the appearance of the *Discours de la méthode* and the *Méditations* of Descartes, a controversy arose between the two philosophers, representatives of opposite schools, the antagonists respectively addressing each other as *O Anima* (spirit) and *O Caro* (flesh). The daring and original genius of Descartes, drawing his materials from his own mind, was contrasted with the erudition and critical acumen of his opponent, who excelled him in caution and courtesy. In 1645 Gassendi received from Cardinal Richelieu the appointment of mathematical professor in the royal college of France, where a numerous and distinguished audience attended his lectures; and two years later he published at Lyons his biographical treatise, *De Vita, Moribus, et Placitis Epicuri*, which was followed by his *Syntagma Philosophia Epicurea* (Lyons, 1649). For many years he had applied himself to the preparation of these works, searching libraries and comparing texts and annotations, and they form together a complete review of the life, eulogy of the character, and reconstruction of the philosophical system of Epicurus. The Epicurean ethics and physical theory of atoms and a vacuum are elaborately vindicated and conformed to the principles of Christianity and the discoveries of modern science, those dogmas of the system being refuted which contravene the interests of religion. His feeble health obliging him to resign his professorship, he retired to the south of France, lived two years in Toulon employed in constructing his philosophical system after meditating on all the philosophers, and in 1653 returned to Paris to consult libraries, and to give the final touches to the work that was to be the most complete and learned statement of his opinions. He was soon obliged to cease from labor, and after a lingering illness his death was hastened by the excessive phlebotomy then in practice by physicians. His *Syntagma Philosophicum*, an encyclopædic view of the entire circle of science, was published posthumously, forming the first two volumes in a complete edition of his works, edited by Montmor and Sorbière (6 vols., Lyons, 1658). It is divided into 3 parts, logic, physics, and ethics, is elaborated with great prodigality of learning and minuteness of criticism, and contains an eclectic philosophy formed by the union of ideas borrowed from various schools rather than a new system. Though formerly regarded as the precursor of the sensational philosophers of the last century, his doctrine of the intellect in the *Syntagma* proves that he was far removed from them. For though he adopts the maxim that "there is nothing in the intellect which has not been in the senses," and maintains that the

*phantasia* or imaginative faculty is but the counterpart of sense, reproducing material images, he yet affirms that the intellect, which is immaterial, immortal, and the characteristic distinction of man, has reflex operations, and apprehends universal and abstract ideas to which neither the senses nor the imagination can attain. His system is therefore akin to that of Locke rather than of the French followers of Locke, and even a part of his phraseology, as the *actiones reflexivæ*, anticipates that of the "Essay on the Human Understanding." It does not appear, however, that Locke was acquainted with his writings. There is an apparent discrepancy between the language of Gassendi in his latest work and that employed in his controversy with Descartes, when it was his object to urge all possible objections rather than to state his own opinions. Not only as a metaphysician, but as an astronomer, geometer, anatomist, Hellenist, historian, and elegant writer, Gassendi merits distinction. He was the personal friend of most of the learned men of his time, the first disciple in France of Bacon, and the precursor of Newton. The aurora borealis, the parhelia, the conjunctions of Venus and Mercury, the occultations of the satellites of Jupiter, and the properties of the magnetic needle were among the subjects of his researches. He wrote the lives of the principal astronomers of his age, and in the preface gave a brief and admirable history of astronomy. He was esteemed personally for amiability, modesty, and moderation, and was long remembered by the peasants around Digne, not as a savant, but as a pious and exemplary priest. The latest complete edition of his works is that edited by Averrani (6 vols., Florence, 1728). An abridgment by Bernier (Paris, 1678) has been several times republished. His life has been written by Sorbière (for the first edition of his collected writings, Lyons, 1658), and by Bougerel (Paris, 1687).

GASTEROPODA (Gr. γαστήρ, belly, and πούς, ποδος, foot), a class of the mollusca distinguished by the under side of the body forming a single muscular foot, on which the animal creeps or glides. The snails, limpets, chitons, &c., are examples of this class. They are divided into two natural groups, one breathing air (*pulmonifera*), the other water (*branchifera*). These form the 4 orders of *probranchiata*, *pulmonifera*, *opisthobranchiata*, and *nucleobranchiata*. The shell is usually spiral and univalve, but sometimes tubular or conical; in the chiton it is multivalve. Some marine species, as the *doris*, *phillidia*, &c., have no shells. Some species are provided with a horny or shelly operculum, which forms the bottom of the foot, and when withdrawn closely shuts the aperture of the shell, to which it is firmly held by the strong muscles of this part of the body. In other species, as the limpet, patella, &c., the animal uses the expanded surface of the foot for attaching the shell firmly to rocks and other surfaces; the air being suddenly expelled from

beneath this surface, the shell is held closely to the rock, as if by strong muscular power.

GASTON, a S. W. co. of N. Carolina, bordering on S. Carolina, bounded E. by Catawba river, and intersected by Catawba creek; area, about 350 sq. m.; pop. in 1850, 8,073, of whom 2,112 were slaves. It has a diversified surface and an excellent soil. The productions in 1850 were 329,377 bushels of Indian corn, 51,762 of wheat, 535 bales of cotton, and 5,625 tons of hay. The value of the gold obtained during the same year from mines in this county was \$97,786. There were 7 saw mills, 1 iron forge, 19 churches, and 1,520 pupils attending public schools. Value of real estate in 1857, \$835,281. Taken from Lincoln co. in 1846, and named in honor of Judge William Gaston. Capital, Dallas.

GASTON, WILLIAM, an American jurist and statesman, born in Newbern, N. O., Sept. 19, 1778, died in Raleigh, Jan. 28, 1844. He was the son of Alexander Gaston, an eminent physician of Newbern, who was a prominent patriot in the early days of the revolution, and was murdered by a band of Tories in the presence of his wife and children. Mr. Gaston was graduated at Princeton, N. J., in 1796, with the highest honors. Returning to Newbern, he studied law, and was admitted to the bar in 1798. Two years later he was elected to the senate of North Carolina, and subsequently to the house of commons, of which he was chosen speaker in 1808. While in the legislature he drew up the statute regulating the descent of inheritances, and the passage of the act establishing the supreme court system of the state was mainly due to his advocacy. In 1808 he was chosen by the federalists a presidential elector, and in 1818 he was elected to the U. S. house of representatives, where he served for 4 years, and, by his prudence, eloquence, and skill in debate, acquired a national reputation. He was one of the most influential leaders of the federal party. He opposed in a forcible speech the loan bill, which proposed during the war with Great Britain to place \$25,000,000 at the disposal of the president, as was generally understood, for the conquest of Canada. His speech, which was widely read, and greatly admired, embraced a thorough discussion of the policy, object, and management of the war. He also made an able speech against the adoption of the previous question as a method of stopping debate in the house. In 1817 he retired from congress to devote himself to his profession. He soon attained the foremost rank in the bar of North Carolina, and for a long period was engaged in all important cases in the state. The chief of these was the "Granville case." This was a suit instituted by the English Earl Granville, the heir of one of the lords proprietors of North Carolina, to try the question of his title to a tract of land covering two-thirds of the state, which he claimed under the original charter granted by Charles II. If Earl Granville had gained the suit, a large proportion of the freeholders of North Carolina would have been

deprived of their estates. The prosecution of a claim of this sort was necessarily very unpopular; but disregarding the clamor of the multitude, and the odium he incurred, Mr. Gaston accepted the post of counsel for the claimant. "He would not," he said, "that a foreigner should fail of justice in our country for want of an advocate." In 1835 he was a member of the convention to revise the constitution of North Carolina, and was placed on all the principal committees, took a leading part in all important debates, and in a great measure guided the business of the convention. He spoke and voted against the proposition to deprive free colored men of the right of suffrage, which at that time they possessed, but which was taken from them by the new constitution. In 1834 he was made a judge of the supreme court of North Carolina, for which office his character, tastes, and intellectual qualities eminently fitted him, and which he refused to abandon for a seat in the senate of the United States. He was a Roman Catholic, and by the constitution of North Carolina, as commonly interpreted, was therefore incapable of holding any state office; but such was the universal regard for his character and ability that the clause in the constitution against the Catholics became a dead letter. He continued in this office till his death, which took place very suddenly. He fell lifeless in the midst of an animated conversation, in his last words declaring his faith in the "All-wise and Almighty."

GASTON DE FOIX, duke of Nemours, a French general, born in 1489, killed at Ravenna, April 11, 1512. He was the son of Jean de Foix, viscount of Narbonne, and of Marie d'Orleans, sister of Louis XII. In 1505 he was made duke of Nemours. In the beginning of 1512, at the age of 23, he was appointed commander of the French army in Italy, to carry on the war with Venice, the pope, and King Ferdinand of Spain, who had formed a "holy league" against Louis XII. of France. Notwithstanding his youth, he was ripe in understanding, and possessed consummate military talents. In less than a fortnight after taking command, by making rapid marches through the snow in midwinter, he raised the siege of Bologna, defeated the Venetian army under the walls of Brescia, and on the same day carried that city by storm. A few weeks later, on April 11, he brought the allied army to a decisive action under the walls of Ravenna, and, in one of the most hotly contested battles ever fought, defeated them with a loss on both sides of 20,000 men. The Italian forces were completely routed, but the famous Spanish infantry, which was then considered the best soldiery of Europe, retreated in good order with unbroken ranks. Gaston de Foix, flushed with victory, was exasperated at the defiant manner in which they left the field, and charged them rashly in person, followed by Bayard and about 20 other knights. He broke their line, but his horse was wounded, and fell in the midst of the enemy. His followers shouted to the Spaniards to spare him, "for he was the brother

of their queen," Ferdinand of Spain, after the death of Isabella, having espoused Gaston's sister, the princess Germaine de Foix. But Ferdinand's second marriage was not popular with the Spaniards, and they gave no heed to this appeal, but despatched Gaston with a multitude of wounds, of which 15 were in the face. When Bayard reached him he was already dead. His loss so disheartened the French that they reaped little advantage from their great victory. Louis XII. exclaimed on hearing the news, that he would give up every foot of territory he had in Italy if he could so recall to life his gallant nephew and the brave men who had fallen with him. A monument in the neighborhood of Ravenna marks the place where he fell. "There are few instances in history," says Prescott, "if indeed there be any, of so brief, and at the same time so brilliant a military career as that of Gaston de Foix; and it well entitled him to the epithet his countrymen gave him of 'the thunderbolt of Italy.' He had not merely given extraordinary promise, but in the course of a very few months had achieved such results as might well make the greatest powers of the peninsula tremble for their possessions. His precocious military talents, the early age at which he assumed the command of armies, as well as many peculiarities of his discipline and tactics, suggest some resemblance to the beginning of Napoleon's career."

GASTRO JUICE. See DIGESTION.

GATAKER, THOMAS, an English ecclesiastic, born in London in 1574, died about 1654. He wrote several works illustrative of the Scriptures. In 1642 he was chosen member of the assembly of divines at Westminster. In 1648 he remonstrated, in conjunction with 47 of his brethren, against the proceedings of the long parliament in relation to the king. In 1652 he published a critical edition of Marcus Aurelius's "Meditations," with notes, and an introductory discourse on the philosophy of the stoics. The best edition of his works is that published at Utrecht in 1698, in 2 vols. folio.

GATES, a N. E. co. of N. Carolina, bordering on Va., bounded S. W. by Chowan and Nottaway rivers, the former of which is here navigable; area, 853 sq. m.; pop. in 1850, 8,426, of whom 8,871 were slaves. The surface is generally level, and much of it is covered with oak and pine timber. The Dismal Swamp occupies the extreme E. part. The principal exports are Indian corn, tar, and lumber, and the productions in 1850 amounted to 28 bales of cotton, 119,678 bushels of sweet potatoes, 810,188 of Indian corn, and 4,204 of wheat. There were 8 corn and flour mills, 8 saw mills, 6 shingle mills, 18 churches, and 520 pupils attending public schools. The county was formed in 1779, and named in honor of Gen. Horatio Gates. Value of real estate in 1857, \$780,824. Capital, Gatesville.

GATES, HORATIO, a major-general in the U. S. army, born in England in 1728, died in New York, April 10, 1806. He early entered the British army, and was an officer under

Braddock, at whose defeat in 1755 he was severely wounded. After the peace of 1763, he purchased an estate in Virginia, where he resided till the organization of the continental army in 1775. Appointed adjutant-general with the rank of brigadier, he accompanied Washington to Cambridge in July, 1775, and in June, 1776, received the chief command of the army which had just retreated from Canada. In the autumn following he joined Washington in the Jerseys, with a considerable detachment, and in March, 1777, in effect superseded Schuyler in the command of the northern army, and was superseded by him in May. When, however, Schuyler was obliged to retreat down the Hudson by the disasters which followed the loss of Ticonderoga, Gates was reinstated in the command by congress, Aug. 4, 1777. The surrender of the British army at Saratoga, which soon followed, gave to him a brilliant military reputation, though it was in large measure due to the skilful previous operations of Schuyler. In the winter of 1777-'8 "Conway's cabal" intrigued to wrest the supreme command from Washington and to bestow it upon Gates. The latter was engaged in no important military operations till in June, 1780, he was appointed to the command of the southern forces. A caution that was given him not to exchange his northern laurels for southern willows proved prophetic, for the disastrous battle of Camden (Aug. 6) blasted his military fame, and he was superseded by Gen. Greene. His conduct was scrutinized by a committee of congress, and he was not acquitted of blame and restored to his military position till after the surrender of Cornwallis. On the conclusion of peace he retired to his estate in Virginia, whence he removed in 1790, after emancipating all his slaves, to the city of New York.

**GATESHEAD**, a municipal and parliamentary borough of Durham, England, on the right bank of the river Tyne, opposite Newcastle, with which it is connected by a viaduct and stone bridge of 9 arches; pop. in 1851, 25,568. Its manufactures comprise ships, anchors, chain cables, nails, hemp, wire ropes, &c. There are extensive collieries and grindstone quarries in the vicinity.

**GATH**, one of the 5 chief cities of Philistia, often mentioned in the history of David and his successors. The giant Goliath, who was slain by David, was either a native or an inhabitant of Gath. It was for centuries alternately under the power of the Jewish kings or independent, except a short period when it was under Syrian rule. In the time of Jerome it was a "very large village." Modern travellers give no description of the place.

**GAUDEN**, JOHN, an English bishop, supposed by some to have been the author of the *Eikon Basilike*, born in Mayland, Essex, in 1605, died Sept. 20, 1664. In the early part of his life he belonged to the popular party. After the outbreak of the civil war, he hesitatingly submitted to the Presbyterian discipline, omitted the lit-

urgy from the church service, and even subscribed to the covenant, although he secretly wrote a treatise against it. After the restoration he was appointed chaplain to Charles II., and successively created bishop of Exeter and of Worcester. He claimed the authorship of the *Eikon Basilike*, or the "Portraiture of his Sacred Majesty in his Solitudes and Sufferings," a work which was once almost universally attributed to Charles himself, and which in one year went through 50 editions. Mr. Hallam and Sir James Mackintosh pronounce his claim valid.

**GAUDENTIUS**, a Latin theologian, bishop of Brescia, about the end of the 4th century. He was elected bishop by the clergy and people when very young, but declined the office till both the expostulations of St. Ambrose and threats of excommunication if he persisted in refusing prevailed over him. Little is known of his life, the most important event being his embassy to the court of Arcadius in 405 to carry aid to St. Chrysostom, for which the latter in one of his letters paid him an eloquent tribute of gratitude. There remain 21 discourses by him, written in a simple and dry style, though full of allegorical and imaginative conceptions.

**GAUDICHAUD-BEAUPRÉ**, CHARLES, a French botanist, born in Angoulême, Sept. 4, 1789, died in Paris, Jan. 26, 1854. In 1817 he accompanied, in the capacity of pharmaceutical botanist, the scientific expedition of Freycinet. The vessel on which he was, the *Uranie*, was wrecked upon the Falkland islands in the spring of 1820, and of the 4,175 botanical specimens which he had collected upward of 2,500 were lost. Upon his return to France he prepared the botanical history of the voyage. In 1830-'33 he took part in the expedition which explored the coast of South America in the *Hermine*, and subsequently circumnavigated the globe again in the *Bonite*. The remainder of his life was devoted to the classification of his specimens and the preparation and publication of his notes, and he carried on an acrimonious controversy with Mirbel on the subject of the process of vegetable growth. In the course of his life he was engaged in 29 duels, from most of which his skill as a swordsman enabled him to escape unharmed. He was nevertheless, according to his friends, averse to duelling.

**GAUGING**, the operation of measuring the capacity of barrels and other vessels of similar form. It is performed either by measuring the various dimensions of the cask, and then calculating by arithmetical rules the contents, according to the geometrical figure which the cask most nearly resembles, or else by simply measuring the diagonal distance from the bung to the opposite side of one head of the cask, and assuming all casks to be of one shape. In the latter method no calculation is needed, as the number of gallons is engraved directly on one side of the same gauging rod by which the dimension in inches is measured. If the cask is not full, it is also necessary to measure

the perpendicular distance from the bung to the surface of the liquor.

GAUL (GALLIA), the name applied by the Romans to two great divisions of their empire, distinguished from each other by the designations Cisalpine and Transalpine (in regard to Rome). Of these, Cisalpine Gaul (Gallia Cisalpina or Citerior), comprising the north of Italy to the confines of Etruria and Umbria, was divided by the Po (Padus) into Cispadane and Transpadane. It was also called Gallia Togata, or Romanized Gaul, from the inhabitants wearing togas like the Romans, and in contradistinction to the S. E. province of the Transalpine country, which was called Braccata from the *bracca* or wide trousers of its people. It was bounded N. W. and N. by the Alps, E. by the Athesis (now Adige), S. E. by the Adriatic, S. by the Rubicon, the Apennines, the Macra (now Magra), and the mountains of Liguria. Transalpine Gaul (Gallia Transalpina or Ulterior) was bounded W. and N. by the sea, E. by the Rhine, S. E. by the Alps, and S. by the Mediterranean and the Pyrénées, thus comprising not only the whole of modern France and Belgium, but also parts of Sardinia, Switzerland, Germany, and Holland. Both divisions were inhabited mostly by people of Celtic race (Gaelic and Kymric), called by the Romans in general Gauls (Galli), by the Greeks *Κελται* or *Γαλαται*; the Celto-Teutonic, Teutonic, Celto-Iberian, Iberian, Tuscan, Greek, and other elements of the population were comparatively small. (See CELTÆ.) These Celts or Gauls, a branch of the great Indo-European family of nations, had left their Asiatic homes at a period preceding the dawn of European history, and had occupied the western regions on the Rhine, Seine, Rhone and Garonne, Ebro and Tagus, as well as the islands of Britain, when the Roman state was still in its infancy. Of a turbulent, roving, and warlike disposition, they had scarcely settled on the shores of the Atlantic, which stopped their migration westward, when some of their tribes commenced entering northern Italy, according to Livy, under Belovesus, a nephew of King Ambigatus, in the time of Tarquin the Elder. Others are said by the same historian to have taken their direction toward the Hercynian forest, under Sigovesus, another nephew of Ambigatus. Still others appear later, it is uncertain whence coming, in Macedon, Thrace, and Greece, where they burned Delphi, 279 B. C., and even in Asia Minor, where they founded Galatia or Gallo-Græcia, in Syria, and in Egypt. Tall, impetuous, and extremely reckless, with long hair and mustaches, they appeared terrible, not only to the effeminate people of the eastern countries, but to the Romans themselves. They fought on horseback, armed with large bucklers, lances, and swords. They were fond of adventure, greedy of gold, and boastful, made the use of arms a profession, served as mercenaries even in Carthage, and challenged foes and friends to single combats. Even where they were settled they preferred hunting and grazing to

agriculture. They were quick of temper, sudden in resolution, and inconstant, and therefore apt to conquer, but not to keep, to destroy, but not to make lasting foundations. There are no precise historical dates for the consecutive invasions of Cisalpine Gaul by the Celts; they are supposed to have occupied several centuries. Tribe followed tribe, and finally we find the Salassians settled in the vicinity of Ivrea (Eporedia), the Insubrians about Milan (Mediolanum), the Cenomani in the region of Verona and Mantua, the Boii in the country now forming the duchies of Parma and Modena and about Bologna (Bononia), the Lingones about Ravenna, the Senones, who came last, in the S. E. of Cispadane Gaul, and other tribes in various other parts of the country. It was not long after the conquest of Veii by the Romans that this people came in contact with the Gauls. These invaders had conquered the northern possessions of the Etruscan confederacy while the Romans were making their attacks on its southern districts. They had pushed the Umbrians southward, taken Melpum (896 B. C.), crossed the Apennines under one of their Brenni, and advanced as far as Clusium. The Tuscans of this city now sought aid from the Romans, who, however, sent no army to their assistance, but despatched the Fabii as envoys to deter the barbarians. The envoys only provoked them, and drew their sword upon Rome. Brennus broke up the camp before Clusium, crossed the Tiber, routed the Romans on the Allia, entered Rome through open gates, and pillaged it; but finally, after an obstinate siege of the capitol, he sold his conquest for gold and retired with his army. Rome long and well remembered the "day of the Allia" (July 18) and all the terrors of the first Gallic invasion. All others proved disastrous to the barbarians. In 367 they were routed near Alba by the old Marcus Camillus, who won there his last victory. In 361 another host, like the first of the Senonian tribe, encamped before the Anio bridge, but marched further toward Campania before fighting a battle. Shortly after returning from Campania they renewed their ravages, and fought unsuccessfully against the dictators Ahala and Peticus. In 350 they again encamped before Rome, keeping it in perpetual terror; but in the following year L. Furius Camillus, a nephew of Marcus, compelled them to retire, an event the fame of which reached even the contemporary Aristotle in Greece. When in a later period the Gauls assisted the Umbrians and Etruscans against the more and more advancing Romans, they were routed in the battle of Sentinum (296), where many of them fought on war chariots, and near the lake Vadimon (283). These disasters, suffered chiefly by the Senonian and Boian Gauls, put an end to the Gallic wars in Italy for nearly 60 years. The Romans, who had conquered Umbria, founded their first colony in Cispadane Gaul, in the land of the Senones, calling it Sena Gallica (now Sinigaglia); Ariminum (Rimini) was founded afterward. The Gauls were too

much weakened to offer any opposition. But strengthened by the arrival of large bodies from beyond the Alps, they took up arms again in 225, and crossed the Apennines, but were soon compelled to retreat, and were routed at Telamon. The Romans continued the war with great vigor, conquered the land of the Boii, crossed the Po, on the opposite banks of which they soon after founded Cremona and Placentia (Piacenza), and subdued the Insubrians (221). The details of all these military events, as for instance the single combats of T. Manlius Torquatus (361) and M. Valerius Corvus (349) with gigantic Gauls, belong to the history of Rome, or rather to the legends of its heroes. When Hannibal crossed the Alps (218) he was eagerly joined by numerous Gauls, but after his final defeat (201) Cisalpine Gaul became an easy prey to the victorious legions. It was made a Roman province at the beginning of the following century, received numerous new Roman colonies, became civilized, industrious, and flourishing, and finally obtained the privileges of Roman citizenship. Of the 11 divisions of Italy, as established under Augustus, it formed the last four. The Salassians, who revolted under the same reign, were nearly exterminated. The Romanization of the province was rapidly developed, and many celebrated Romans of the later period were its natives, as for instance Livy, who was born at Patavium (Padua) in 58 B. C.—Of Transalpine Gaul, upon the southern coast of which Phœnicians, Rhodians, and Phœæans had, at various remote periods, carried colonies and some rudiments of civilization, the arts of writing, mining, and working metals, the olive and the vine, the Romans first entered the S. E. angle. In 166 B. C. the Maritime Alps were first crossed by Roman legions, who defeated the tribes of the western slopes. In 154 they defended Massilia (Marseilles), a colony of Phœæa, and herself the mother of numerous colonies, against the Ligurians. Twenty years later they fought against the Salyes, a Celto-Ligurian tribe. Soon after they founded Aquæ Sextiæ (Aix), and subdued the Allobroges, who lived between the Rhone (Rhodanus) and the Isère (Isara), and were assisted by the Arverni (121). This new course of Roman conquests was interrupted by the great Cimbro-Teutonic movement (see CÆSAR), but the two victories of Marius at Aquæ Sextiæ (102) and on the Raudian fields (101), over the Teutons and Cimbri, saved both the Transalpine and Cisalpine possessions of Rome. The former, eventually extending from the Alps to the Pyrénées, and embracing the modern provinces of Dauphiny, Languedoc, Provence (from the Roman *Provincia*), Roussillon, and Nice, were called Gallia Braccata or Comata, from the long hair (*coma*) of the inhabitants. The internal development of the main parts of Transalpine Gaul, during the times when the Cisalpine country was successively Gallicized and Romanized, cannot be traced in historical records. When the Romans,

in the last period of the history of their republic, finally entered the great north-west, they found the country occupied by various tribes, ruled by nobles, priests, and chiefs or kings. Cæsar, the conqueror of the people and the historian of their last desperate struggles for independence, comprehends all of them under the general name of Gauls, dividing them, however, into the 3 large groups of Belgians, in the N. E. between the Rhine, Seine (Sequana), and Marne (Matrona); Celts, or Gauls proper, in the centre and west, between the Seine, Marne, and Garonne (Garumna); and Aquitanians, in the S. W., between the Garonne and the Pyrénées. In the first of these groups Kymric and Belgic elements seem to have prevailed, in the second Gaelic, in the third Iberic and other non-Celtic elements, though the divisions of Cæsar do not fully coincide with the lines of distinction drawn by modern ethnologists. Among the more important tribes were the Batavi, near the mouths of the Rhine; the Nervii, in the S. W. of modern Belgium; the Eburones, about Liège; the Ambiani, about Amiens; the Morini, "the remotest of men," about Boulogne; the Atrebatæ, in Artois; the Bellovacæ, about Beauvais; the Suessones, about Soissons; the Parisii, about Paris (Lutetia); the Remi, in Champagne (Rheims); the Treveri, about Treves; the Teutonic Tribocci, Ubii, and Nemetes, on the Rhine; the Eburones, about Evreux; the Cenomani, in Maine; the Armorican Nannetes (Nantes), Veneti (Vannes), and Redones (Rennes), the chief representatives of the Kymric race, in Brittany; the Turones, in Touraine; the Andes or Andegavi, in Anjou; the Carnutes, about Chartres and Orleans; the Lingones, about Langres; the Senones, about Sens (Agendicum); the Lemovices, in Limousin; the Santones, in Saintonge; the Pictones, in Poitou; the Arverni, in Auvergne; the Helvii, in Vivarais; the Gabali, in Gévaudan; the Ædui, in the region of Autun (Bibracte); the Mandubii, about Sainte Reine and Alise (Alesia); the Insubres, in Lyonnais; the Bituriges, in earlier times a leading tribe, about Bourges (Avaricum); the Sequani, about Besançon (Vesontio); the Helvetii, in Switzerland; the Bituriges Vivisci, about Bordeaux (Burdigala); and the Tarbelli, in Béarn.—Compared with their eastern neighbors, the Germans, the Gauls had reached a certain degree of culture at the time of Cæsar's invasion. They had towns, and used the art of fortification with success; they had long known the arts of embroidering and working metals, and were regarded as the inventors of various implements of husbandry; the Armoricans possessed a navy; the Gallic country was reputed to be the richest in Europe. The Romans, however, were fully entitled to call them barbarians. Their manners were rude, their speech was rough and hardly intelligible, milk and flesh of swine were the principal aliments, their villages were adorned or rather disfigured with inhuman trophies, the treatment of captive or slain enemies was bar-

barous, bloody fights and duels were customary, hounds were used in war, polygamy was not prohibited, and females were little more than slaves; the polytheism which prevailed among the common people, especially among the Gaul, was ruder than that of Italy; the mysteries of the druids, whose influence prevailed chiefly among the Kymri, were stranger than those of the augurs, and the altars of the gods smoked with the blood of human victims. (See *DRUIDA*, and *BARD*.) The remains commemorative of Gallic culture are extremely scanty, and many a French writer of the romantic school has tried in vain to shed lustre over the life and character of the people who, with their successive conquerors, the Romans and Franks, were the ancestors of the French nation. The chief national features of resemblance are vivacity and rapidity in resolution and action, and great love of military glory. It must also be acknowledged that in the defence of their native soil and independence the Gauls of the 1st century B. C. developed the same dauntless and desperate courage and resolution which made the France of the revolution invincible. The absence, however, of national union and centralization, and the genius of a Cæsar in the camp of the enemy, led to their conquest. The details of that bloody war may be read in the "Commentaries" of the great Roman general himself. Its chief events (as far as regards Gaul) are the defeat of the Helvetians in the murderous battle near Bibracte, and the expedition against the Suevi under Ariovistus undertaken on the call of the Ædui, in 58; the conquest of Belgic Gaul in 57; the invasion of Armorica or Brittany by land and sea, the submission of Aquitania, and the reduction of the wild tribes on the N. E. coast, in 56; the sudden and successful attacks of the Eburones under Ambiorix, and their annihilation, in 53 and 52; the great rising of central Gaul under Vercingetorix, the double blockade at Alesia, and the fall of Avaricum, the last stronghold of the natives, in 52 and 51. The loss of the Gauls in these struggles, in which genius and discipline conquered unbridled and tumultuous valor, was little less than a million of men. The whole Transalpine country was divided by Augustus into 4 provinces: Gallia Narbonensis (Narbonne), the former *Provincia Romana*, Gallia Aquitania, Gallia Lugdunensis, and Gallia Belgica, to which were added later the divisions Germania Superior or Prima, and Germania Inferior or Secunda, on the Rhine. Other subsequent divisions are less important. For more than 2 centuries after its conquest by Cæsar, Gaul remained almost entirely quiet, and its Romanization progressed rapidly, the national habits and religion retiring by degrees toward the shores of the north-western sea, and eventually finding refuge in the islands beyond it. The history of the country in the times of the Roman emperors, under the later of whom it was Christianized, belongs to that of Rome. Civil wars and dissensions in the 3d

century, and later the invasions of the Alemanni, Franks, Burgundians, Visigoths, Huns, and other barbarians, brought about the decay. Clovis made it Frankish. (See *FRANCE*.)

GAUSS, KARL FRIEDRICH, a German mathematician, born in Brunswick, April 30, 1777, died in Göttingen, Feb. 23, 1855. He early displayed such remarkable capacity for mathematical calculation, that (his parents being poor) the duke of Brunswick took charge of his education. At the age of 18, while a student at Göttingen, he solved a problem which had occupied geometers from the time of Euclid, that of the division of the circle into 17 equal parts. In 1801 he published his *Disquisitiones Arithmeticae*, treating of indeterminate analysis or transcendental arithmetic, and containing, beside many new and curious theorems, a demonstration of the famous theorem of Fermat concerning triangular numbers. It gave him at once a distinguished place among scientific men. He was one of the first to calculate, by a new method, the orbit of the newly discovered planet Ceres, and afterward that of Pallas, for which he received from the French institute in 1810 the medal founded by Lalande. In 1807 he was appointed professor of mathematics and director of the new observatory at Göttingen, a position which he retained till his death. His profound works, though produced with a rapidity that astonished the savants of Europe, were elaborated with the greatest care, and many of them mark an era in the history of science. He wrote only on mathematics, but was also interested in politics and literature, loved to read the newspapers and converse on the events of the day, and is said to have been exasperated that any credit was given to the accounts of table-tippings at a time when so many efforts were made to enlighten the public by popularizing the sciences. From the year 1828 he never left Göttingen, and he did not see a locomotive till 1854. As a mathematician, he was pronounced by Laplace the greatest in Europe. Among the more important of his works are *Theoria Motus Corporum Cælestium* (Hamburg, 1809; translated into English by O. H. Davis, Boston, 1857); *Intensitas Vis Magnetica Terrestris* (Göttingen, 1838); *Dioptrische Untersuchungen* (Göttingen, 1841); and *Untersuchungen über Gegenstände der höhern Geodäsie* (Göttingen, 1844). Being appointed to measure a degree in Hanover, he rendered the most distant stations visible by means of the heliotrope, an instrument of his invention for reflecting solar light; and in connection with Weber he made valuable investigations concerning terrestrial magnetism.

GAUTAMA. See *BUDDHISM* and *BUDDHA*.

GAUTIER, THÉOPHILE, a French writer, born in Tarbes, Aug. 31, 1811. He studied painting, but in 1828 gave up the brush for the pen, and published a small volume of poems, remarkable for picturesque originality. An eccentric and somewhat licentious novel, *Mlle. de Maupin*, which caused a considerable sensation was the



foundation of his literary fame. He contributed to the *Revue de Paris*, and more largely to the *Artiste*, of which he afterward became chief editor. In 1836 he was intrusted with the dramatic *feuilleton* of the *Presse*, and soon made his mark among those who are usually styled in Paris *les princes de la critique*. In 1854 he left the *Presse*, and took a similar position on the staff of the *Moniteur*. He has published a number of poems, novels, and books of travels, and has written dramas, vaudevilles, and ballets.

GAVARNI, the pseudonyme of a French caricaturist, whose real name is SULPICE PAUL CHEVALIER, born in Paris in 1801. He was at first a machinist, and commenced his artistic career by drawing theatrical costumes and fashion plates. In 1835 he began to publish an illustrated satirical paper which he called *Les gens du monde*. Many of his sketches were reproduced in the *Charivari*. A collection of his designs was published in 1845, in 4 vols., with letterpress by Balzac, Théophile Gautier, Jules Janin, &c. Two other volumes were added in 1850.

GAVAZZI, ALESSANDRO, an Italian preacher and political agitator, born in Bologna in 1809, joined the order of the Barnabites in 1825, and afterward officiated as professor of rhetoric at Naples. He was in Rome at the outbreak of the revolution in Lombardy, delivered in the Pantheon a funeral oration on those who had fallen in that struggle, and made passionate appeals in behalf of the independence of Italy. The pope appointed him almoner of the Roman legion which was despatched to Vicenza, and he was called by the people the *Pietro Eremita*, or Peter the Hermit, of the national crusade. In Venice he addressed immense crowds in St. Mark's place, and thus gained means for conducting the war. Pius IX., however, alarmed at the spread of the revolution, caused his army to return to Rome. Gavazzi repaired to Florence, and, after his expulsion from that city, to Genoa; but he was recalled to Bologna, where he was received with great enthusiasm by the people who had risen against the papal government. He was appointed by the republican government chaplain in chief of the army, and after the French occupation of Rome (1849), he found an asylum in England. He has since lectured in the United Kingdom and in the United States and Canada against the church and government of Rome. Since 1854 he has chiefly resided in London.

GAVELKIND, a tenure in England by which the estate descends, not to the eldest son, as by common law, but to all the sons, or if there be no sons, to all the brothers. The word is said by some persons to be derived from the English words "given to all the kindred;" but other derivations are suggested. It prevails throughout the English county of Kent, but is seldom met with in other counties. The best authorities, including Selden, believe that this was the general custom of England before

the Norman conquest. It is not the same with the universal tenure of this country, because here lands descend, as personals do both here and in England, to all the children, females included; and for want of them to brothers and sisters equally.

GAVIAL, or GARRHIAL, a crocodilian reptile of Asia and Africa, of the genus *gavialis* (Geoffroy), characterized by its very long, straight, and narrow jaws, somewhat enlarged at the extremity. The number of teeth is greater than in other crocodilians, being 110 to 120 in all, from 50 to 60 in each jaw; the upper mandible is not pierced for the passage of the lower teeth, but has 2 grooves in each side for the reception of the 1st and 4th under teeth, the anterior being deep and in the front of the jaw; the 5 or 6 anterior pairs, both above and below, are larger than the rest of the teeth, the largest being the 1st, 8d, and 4th above, and the 1st, 2d, and 4th below, and all are of a conical form, slightly depressed from before backward. The division of the lower jaw into 2 branches begins about the 22d tooth of the series of 26. The bony opening of the nasal fossæ is triangular, and this is closed in the males by a large oval cartilaginous sac, whose cavity is supposed to serve as a reservoir of air when the animal plunges under water. There are 5 toes on the fore paws, and 4 on the hind, the middle 3 of the former being united at their base by a very short web, and the external 3 of the latter by a thicker and more extensive membrane covered with small granular scales; the nails are feebly curved. The nuchal plates are 2, of large size and ridged, and oval form, sometimes with a small plate on each side of them; the cervical plates, 4 pairs, extend from the middle third of the neck to the dorsal covering in a longitudinal band, and are ridged on their median line; the upper part of the trunk is protected by 4 longitudinal series of ridged quadrilateral scales, each containing about 18, and the sides of the neck and flanks by flat smooth scales of medium size; the tail has from 34 to 40 circles of scales, becoming crested about the 6th or 7th on each side, the double portion becoming single and the highest near the middle of the length; the under surface of the body is covered by about 60 transverse rows of smooth, oblong, quadrilateral scales, each pierced on the posterior border by a small opening. The scales of the limbs are rhomboidal, and on the posterior ones from the ham to the little toe furnished with a serrated crest. The common species, the gaval of the Ganges (*G. Gangeticus*, Geoff.), is of a deep sea-green color above, with numerous irregular brown spots, smallest and thickest about the jaws, and below pale yellowish white; the young have the back and limbs banded with black. It attains a length of over 20 feet, though the specimens usually seen are considerably smaller than this; in the adult the head is a little less than  $\frac{1}{3}$ , and the tail about  $\frac{1}{4}$  of the total length of the animal. Though most common in the river Ganges, it is found in other rivers of Asia; and other species

have been described from Africa. Notwithstanding its large size and numerous teeth, the gavial feeds on fishes and small prey; the narrowness and feebleness of the jaws do not enable it to seize large land animals, like the wide and stronger jawed crocodile and alligator. The general structure and habits of the gavial do not differ essentially from those of the CROCODILE, to which article the reader is referred.—The fossil crocodiles which existed toward the end of the secondary epoch all had the elongated jaws of the gavial, the true crocodiles not appearing until the tertiary period at the same time with their mammalian prey. The *crocodilus priscus* of Sömmerring, the *teleosaurus* and the *stenosaurus* of Geoffroy, all had the cranial characters of the gavial. This reptile, though now confined to the warmest regions of the earth, in former geological ages lived with alligators and crocodiles in northern and now temperate Europe.

GAY, CLAUDE, a French traveller and botanist, born in Draguignan, March 18, 1800. In 1828 he went to Chili to study the botany, zoology, geology, and meteorology of that country, extending his observations through its almost unexplored regions, and receiving great encouragement from its government. With the exception of a few months in 1832, when he returned to France for meteorological instruments, he remained in Chili until 1842. After his return to Paris in that year he published at the expense of the Chilean government, and with the aid of several assistants, especially in the historical part, his *Historia física y política de Chile* (Paris, 1843-'51), in 24 vols., of which 6 are devoted to the history, 2 to the historical documents, 8 to the botany, and 8 to the zoology of the country, beside an atlas in 2 large 4to. vols., composed of 315 plates. This work is written entirely in Spanish, and is considered second only in authority and value to those of Humboldt on South America. M. Gay has also made scientific explorations of Peru, Brazil, and Buenos Ayres, and has travelled in Russia, Asia Minor, Greece, and Morocco. He is the author of a number of special treatises on botanical subjects.

GAY, DELPHINE. See GIRARDIN.

GAY, EBENEZER, D.D., an American clergyman, born in Dedham, Mass., Aug. 26, 1696, was graduated at Harvard college in 1714, and was settled over the church at Hingham, Mass., in 1718, its third pastor since the settlement of the town in 1635, and of which he remained the clergyman 69 years and 9 months, till his death in 1787. On his 85th birthday he preached a sermon from the text: "Lo, I am this day fourscore and five years old," which, under the title of "The Old Man's Calendar," has been frequently republished in America, went through several editions in England, and was translated into one or two of the continental languages of Europe. Many other of his sermons were published, and had a high reputation in their day. He was a man of great learning, and

was known for his wit as well as for his virtues. In his theology he was liberal, though he was a tory in principles, and suffered some persecution from his own parishioners during the war of the revolution. Ex-president John Adams said, on the first distinctive announcement of Unitarianism in this country, that he had heard the doctrine from Dr. Gay long before. He married Jerusha Bradford, a granddaughter of Gov. Bradford of Plymouth colony, by whom he had a large family. He died when 90 years of age, on Sunday, when about to enter the pulpit for the services of the day.—MARTIN, an American physician, great-grandson of the preceding, born in Boston, Feb. 16, 1803, died there, Jan. 12, 1850, was graduated at Cambridge in the class of 1823. He had a high reputation as an analytical chemist, and his testimony was of great weight in courts of justice in cases of death by poisoning, at a time when but little attention had been given to this branch of medical jurisprudence.—WINKSWORTH ALLAN, an American artist, brother of the preceding, born in Hingham, Mass., Aug. 18, 1821. At an early age he became a pupil of Mr. Weir, professor of drawing at the military academy at West Point, with whom he remained several years. Subsequently he went to Europe, and passed 5 years there in study, a part of the time under Troyon in Paris. He paints exclusively in landscape, and his style is that known as the modern French. "A Scene in the White Mountains," a picture painted for the Boston Athenæum, is a good specimen of his method of treatment of mountain scenery. Some of his best works depict that region. But he has also painted views of Nantasket beach and rocks, which have attracted much attention, and some critics have pronounced coast scenery to be his proper speciality.

GAY, JOHN, an English poet, born near Torrington, Devonshire, in 1683, died in London, Dec. 4, 1732. He was of an ancient but reduced family, and after receiving an elementary education at the grammar school of Barnstaple, was apprenticed to a silk mercer in London, but soon abandoned this business for literary pursuits. In 1711 he produced his poem "Rural Sports," which he dedicated to Pope, and a life-long friendship sprung up between the two poets. In the following year he became secretary to the duchess of Monmouth. His next work, "The Shepherd's Week," was written to throw ridicule on the pastorals of Ambrose Philips, and met with great success. In 1713 he brought out a comedy called "The Wife of Bath," which was acted only 8 nights. In 1714 he accompanied the British ambassador, Lord Clarendon, to Hanover as secretary. On the death of Queen Anne, however, he was dismissed from office, and driven once more to use his pen as a means of support. Soon after returning to England he produced a drama entitled "What d'ye Call It?" which was so well received that he made another attempt of a similar nature, in which he is said to have

been assisted by Pope and Arbuthnot; but owing to its personality and indelicacy, the "Three Hours After Marriage" proved a decided failure, and involved its author for a time in disgrace. In 1727 his celebrated "Beggars' Opera" was brought on the stage, and was represented for 62 successive nights, 4 of which were for his own benefit, and yielded him nearly £700. This piece was followed by another opera entitled "Polly;" but the lord chamberlain forbade its representation, and Gay was constrained to publish it by subscription, by which he realized £1,100 or £1,200. The most important of his other works are "Trivia, or the Art of Walking the Streets of London," and his "Fables," which are among the best of their kind in the language. Of his minor poems, the ballads of "Black-eyed Susan" and "Twas when the Sea was Roaring" are the most popular. Gay was at one time rich, but he lost nearly all his property by the bursting of the South sea bubble. His latter days were spent in the house of the duke of Queensberry. The prominent characteristics of his poetry are wit, simplicity, and sweetness. The best edition of his works is that of W. Coxe (London, 1796); the best edition of his "Fables," that of O. F. Owen (London, 1856).

GAY, MARIE FRANÇOISE SOPHIE, a French novelist, born in Paris, July 1, 1776, died March 5, 1852. She was the daughter of a French financier named Nichault de la Valette, and was married in 1793 to M. Liottier, from whom she was divorced in 1799. She then became the wife of M. Gay, receiver-general of finance in the department of La Roër, under the empire. She resided at Aix la Chapelle, where she formed a friendship with Pauline Bonaparte. As early as 1802 she had published anonymously in the *Journal de Paris* an article upon Mme. de Staël, and in the same year appeared her first novel, *Laure d'Estell*, which had a moderate success. She now laid aside her pen for a time, and in the fashionable society which gathered at her house was distinguished for wit and agreeable manners. In 1813 she published *Léonie de Montbreuse*, which is considered one of her best novels. This was succeeded in 1815 by *Anatole*, which narrates the loves of a deaf-mute, and in 1818 by *Les malheurs d'un amant heureux*, a very lively picture of manners during the empire. She continued to produce novels and books of various sorts until a few years before her death, among them *Les souvenirs d'une vieille femme*, a piquant abstract of her personal memoirs. She wrote for the stage, but not with marked success.

GAY-LUSSAC, JOSEPH LOUIS, a French chemist and physicist, born in St. Leonard, Limousin, Dec. 6, 1778, died in Paris, May 9, 1850. He was the eldest of 5 children, 3 daughters and 2 sons, of Antoine Gay, judge of that portion of St. Leonard called Pont de Noblat. The father adopted the additional name Lussac from that of a neighboring village, of which he was

principal proprietor. In the troubled times of the revolution the chief portion of his estate was confiscated, the father hardly escaping even with his life. In 1794 the eldest son was sent to Paris to complete his education. He soon displayed great mathematical talents, and in Dec. 1797, entered the polytechnic school, then called *l'école centrale des travaux publics*. From this he passed to the school of roads and bridges, where he became the favorite pupil of Berthollet, who soon recognized and encouraged his talent for original investigation, and placed him with his own son at the government chemical works at Arcueil, where the new bleaching process by chlorine was undergoing a course of experimental investigation. After this he returned to the polytechnic school as tutor. In 1802 he read before the academy a paper on the precipitation of the metallic oxides. In 1804 the institute of France, in order to determine if possible the question as to the diminution of the magnetic force at great heights above the surface, commissioned Gay-Lussac and Biot to conduct the investigations for this purpose; and at the request of Laplace the small balloon was furnished them which had been used in the expedition in Egypt. Ascending at 10 o'clock A. M., Aug. 24, they endeavored at an elevation of 4,000 metres to solve the problem by observing the time of duration of the oscillations of a needle suspended horizontally; the longer the vibrations the less of course being the force which brings back the needle. The rotation of the balloon itself seriously interfered with the observation, and the results were not deemed satisfactory. On Sept. 16 Gay-Lussac made another ascent alone at 9 h. 40 m. A. M., rising to the extraordinary height of 7,016 metres, or about 23,000 feet, above the level of the sea; and at 8 h. 45 m. he descended, landing between Rouen and Dieppe, 40 leagues from Paris. The results of his observations made important additions to our knowledge of the composition of the atmosphere, and its varying conditions at different heights. (See AEROSTATION.) Alexander von Humboldt investigated with him the qualities of the air brought down, and in their joint paper to the academy, Oct. 1, 1804, appeared the first announcement of the union of oxygen and hydrogen to form water in the simple proportion of 100 parts by measure of the former to 200 parts of the latter. In 1805 he visited Vesuvius with Humboldt and Leopold von Buch, and happily the volcano at the time of their observations suddenly became active. Gay-Lussac considered that volcanic phenomena are due not to the central heat of the globe, but to the action of sea water flowing in upon combustible matters. He adopted Von Buch's views as to the uplifting bodily of volcanoes. At Naples he showed the difference in the composition of the air contained in sea water and that of the atmosphere, the former consisting of more than 80 parts of oxygen in 100, and the latter of only 21. His observations upon the irregularities of the mag-

netic needle, made during his travels in Italy, and thence into Germany with Humboldt, were published in vol. i. of the *Mémoires de la société d'Arcueil*, of which society Gay-Lussac was one of the earliest and most active members. In 1807 he directed his studies to the expansion of the air and gases under increased temperatures, and established the law that when free from moisture they all dilate uniformly and to equal amounts for equal increments of temperature—at least when between  $0^{\circ}$  C. and  $100^{\circ}$  C. He also showed that the gases combine in simple proportions of their volumes, and that the contraction sometimes experienced by a compound of several is always an exact simple fraction, as  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$ , of their joint bulk. His researches were in the same field with those in which Dalton also was engaged, and his conclusions were in general confirmatory of those of the English chemist, and served to extend the application of the newly devised atomic theory to gaseous bodies. The discoveries of Davy in decomposing by the voltaic pile compounds before regarded as simple, excited much interest in France; and Gay-Lussac and Thénard were appointed by Napoleon to pursue this class of researches. In the course of their experiments, on June 8, 1808, Gay-Lussac, by the accidental projection of a piece of potassium, lost for some time the use of his eyes. The results of their investigations were published in 1811 in 2 vols. 8vo., entitled *Recherches physico-chimiques*. By means of the great battery provided by the institute they prepared potassium and sodium in larger quantities than these elements had been obtained by Davy. They also developed the compound character of boracic and fluoric acids, introduced new methods of analyzing organic substances by their combustion with chlorate of potash, and elucidated the composition of many of these compounds. In the *Annales de chimie et de physique*, which Gay-Lussac edited together with Arago, and in other scientific journals of the day, were published many papers presenting other original researches of importance by the former, as upon the newly discovered elements iodine and cyanogen, on Prussian blue, on chloric and hydrosulphuric acids, on capillary attraction, and many other subjects. In 1816 he invented the siphon barometer, since modified by Bunten, by whose name it is best known. He also invented instruments for estimating the quantities of alcohol, chlorine, and alkali present in solutions, known severally as the alcoholometer, chlorometer, and alkalimeter. In 1832 he gave up the professorship at the Sorbonne, to which he had been appointed in 1809, and accepted that of general chemistry at the *jardin des plantes*. As an expounder of science he was distinguished for the clearness of his explanations. In 1831 he was chosen by the electors of his native town member of the chamber of deputies; in 1837 he was reelected, and in 1839 he was made a peer of France.

GAYA, a town of British India, in the dis-

trict of Bahar, presidency of Bengal, 265 m. N. W. from Calcutta; pop. 43,451. It consists of two parts, the old town, in which the Brahmins reside, and the new town, called Sahibgunge, from having been chiefly laid out by the British, inhabited by the secular population and Europeans. Gaya proper, or the old town, is well built in a peculiar style of architecture, but the streets are narrow, filthy, and hardly passable. There are numerous shrines and places of pilgrimage, visited by devotees from all parts of India. The Phalgu, a tributary of the Ganges, flows through the town, and is deemed a sacred stream. The most revered structure here is the temple of Vishnu, erected by a Mahratta princess, 82 feet in length, and crowned by an octagonal pyramid over 100 feet high. In the immediate vicinity are the remarkable ruins of Buddha-Gaya, supposed to have been the scene of the avatar of Buddha or Gautama; whence the sanctity of the existing town is derived, though it now contains no worshippers of Buddha. Sahibgunge, or the new town, has wide and straight streets, with rows of trees and foot walks on each side; but its houses for the most part are mere mud-built huts, and there are no public edifices, save a hospital for invalid pilgrims. On an area between the two towns stands the British civil establishment.

GAYANGOS, PASCUAL DE, a Spanish orientalist, professor of Arabic in the university of Madrid, born June 21, 1809. He studied at Paris under Silvestre de Sacy, travelled through northern Africa in 1828, married an English lady at Algiers, and was from 1831 to 1836 interpreter to the French ministry of foreign affairs. He afterward resided several years in England, and has published his most important works in the English language. His "History of the Mohammedan Dynasties of Spain," translated from the text of Al Makkari, with learned notes, appeared in London in 1840-'43, in 2 vols. 4to. Prescott, who was greatly indebted to Gayangos for assistance in collecting materials for his historical works, calls this work "a treasure of oriental learning." In 1843 he was recalled to Madrid to fill the professorship which he still holds. He has made in conjunction with H. Vedia a Spanish translation of Ticknor's "History of Spanish Literature," to which he added copious notes (Madrid, 1851-'6).

GAYARRÉ, CHARLES A. ARTHUR, an American historian, born in Louisiana, Jan. 9, 1805. He belongs to one of the most ancient families in the state, some of his ancestors having assisted in the foundation of the French colony on the banks of the Mississippi; he was educated at the college of New Orleans, and gave early evidence of talent as a forcible writer. In 1825, the draft of a criminal code having been laid before the legislature by Edward Livingston, young Gayarré published a pamphlet in which some of its provisions were ably canvassed; and such was the sensation caused by this youthful performance that the adoption of

the code was indefinitely postponed by the legislature. He then repaired to Philadelphia, and studied law under the direction of William Rawle; he was admitted to the bar in 1829, and a few months later returned to his native state. An *Essai historique sur la Louisiane* (2 vols. 12mo.), which he published at that time, attracted attention; and he was soon elected by an almost unanimous vote a member of the state legislature for the city of New Orleans, and was chosen to write the congratulatory address which that body sent to France on occasion of the revolution of July, 1830. The next year he was appointed deputy attorney-general of the state, and in 1833 presiding judge of the city court of New Orleans. In 1835, although he had but just reached the constitutional age, the legislature elected him to the U. S. senate. Impaired health prevented his taking his seat, and by medical advice he went to Europe, where he remained for nearly 8 years. In 1844 he again entered the state legislature, and was re-elected in 1846. Gov. Johnson appointed him secretary of state, and Gov. Walker, who succeeded Gov. Johnson, insisted upon his retaining the office. During his 7 years of official service as secretary, the banks were kept in a healthy condition, public education was fostered, and he succeeded in establishing a respectable state library, which now contains many valuable documents collected in the archives of France and Spain. At the same time his leisure was devoted to historical studies. He has published in French an *Histoire de la Louisiane* (2 vols. 8vo., New Orleans, 1847); and in English, the "Romance of the History of Louisiana" (12mo., New York, 1848), a lively and poetical introduction to a new history of the state; "Louisiana, its Colonial History and Romance" (8vo., New York, 1851); "Louisiana, its History as a French Colony" (2 vols. 8vo., New York, 1851-2); "History of the Spanish Domination in Louisiana, from 1769 to Dec. 1803" (New York, 1854). Mr. Gayarré has also published two lectures "On the Influence of the Mechanic Arts," delivered in New Orleans; a satirical drama, the "School for Politics;" and an "Address to the People of the State on the late Frauds perpetrated at the Election held on the 7th of November, 1853, in the City of New Orleans." After this publication he left the democratic party to join the Americans, but he has since withdrawn from them, and now lives retired from political life.

GAZA (Arab. *Ghazze* or *Ghuzze*), a town of Syria, built partly on a steep hill, partly on the plain below, on the road leading to Egypt, between the Mediterranean and the desert; pop. about 16,000, of whom 200 or 300 are Christians. It is situated about 8 m. from the sea, in the neighborhood of rich gardens, is not fortified, and consists partly of mud cottages, partly of ruinous stone buildings, which are occupied by the government and chief citizens. It is an important entrepot for the caravan traffic between Egypt and Syria. It has few rel-

ics of antiquity, and its only interesting edifice is a mosque which was originally a Christian church, founded, according to tradition, by the empress Helena. The ancient city of Gaza, which some suppose to have stood nearer the sea than the present town, is known in the Bible as the most southern of the 5 confederate cities of the Philistines, and is often mentioned, as for instance in the history of Samson. Its Hebrew name signifies "strong." On the conquest and division of Palestine by the Israelites, it was allotted to the tribe of Judah, which conquered it, but lost it again. It shared in the wars of the Philistines with the Hebrews. Having become a possession of Persia, it was taken after an obstinate siege by Alexander the Great (332 B. C.); nearly all its inhabitants perished during the assault, and its commander Batis, at the conqueror's order, was dragged around the walls at the wheels of a chariot. After Alexander's death it was taken by Antigonus, and witnessed the defeat of Demetrius Poliorcetes by Ptolemy (312). After the restoration of Jewish independence by the Maccabees, it was several times assaulted, besieged, and taken by the princes of that house. The Romans ceded it to Herod the Great. Under Nero it was taken by the revolted Jews. Constantine restored its ancient splendor, made it a bishopric, and gave it the name of Constantia, with various privileges. These were abolished by Julian the Apostate, and restored by his Christian successors. The Arabs took it (634), immediately after the death of Mohammed. The crusaders captured it in 1100, and from them it was wrested by Saladin. In the 13th century it witnessed the double defeat of the Christian armies by the Khovaresmians and of the emir of Damascus by the Egyptians, and in 1556 that of the Mamelukes by the Turks. In 1771 it was seized by the revolted Ali Bey, and in 1799 by the French under Kleber.—Another Gaza (correctly, Gazaca) was in Media Atropatene, a summer residence of the Median kings. Ruins of it are seen between Miana and Tabreez.

GAZA, THEODORE, one of those learned Greeks who contributed to the revival of letters in Italy, born in Thessalonica about 1400, died in Abruzzo in 1478. After the capture of his native town by the Turks in 1480 he fled to Italy, where he introduced a more exact knowledge than had before existed of the two principal philosophers of antiquity. He was a peripatetic, and devoted himself especially to translating into Latin the works of Aristotle. After assisting at the council of Florence in 1489, he taught Greek at Ferrara by the invitation of the duke, and founded there an academy. In 1455 he was called by Pope Nicholas V. to Rome, where he translated the "Problems" of Aristotle, and other Greek works. He afterward lived at Naples under the patronage of Alfonso the Magnanimous, and at Rome under that of Cardinal Bessarion. His translations were admired by the scholars of the 15th and 16th centuries.

**GAZEL**, or **GHAZEL**, a kind of lyric poem, consisting of from 5 to 17 stanzas of 2 lines each, all the second lines of which rhyme together. It is a favorite form in the poetry of the Turks and the Persians, and may be called the sonnet of the East. The last couplet always contains the real or assumed name of the author. The subjects treated in the gazel are either erotic and bacchanalian, or allegorical and mystical. Hafiz excels in this form of the lyric, and imitations of it have been made in German by Platen, Rückert, and others.

**GAZELLE**, the type of a group of the antelope family (see **ANTLOPE**), of beautiful form, small size, graceful carriage, and an expression of mildness and tenderness which has made it the emblem of womanly beauty in the amatory poetry of the eastern nations. Both sexes are provided with horns, nearly over the orbits, annulated and striated, nearly vertical, and bending outward and at the top inward in a lyrate form, and of a black color; the shape of the ancient lyre is said to have originated from using in its construction the horns and the frontal bone of antelopes, the strings being passed from a cross bar at their tips to a second fastened across the orbits; the bony core of the horn is solid. They have a small lachrymal sinus, inguinal pores, generally tufts upon the knees, a short dark-tufted tail, and 2 or 4 mammae; the darker color of the sides is separated from the white of the abdomen by a very dark band; the eyes are prominent, dark colored, with a soft and gentle expression; the nose is ovine. They are gregarious, inhabiting the open and barren plains of northern Africa and western Asia, shy and difficult of approach, and extremely swift. The common gazelle, or Barbary antelope (*gazella dorcas*, H. Smith), the *gasal* of the Arabs, is generally regarded as the *dorcas* of *Ælian*, and the *zebel* of the Scriptures. It is a little less than the roebuck in size, with round, black, lyrated horns, about 18 inches long, with 12 or 18 bars, and sharp points turned forward; the general color is pale fulvous, extending down the front and outside of the limbs; the lips, nose, buttocks, under parts, and inside of legs white; a rufous tint on the forehead, blackish in the middle, and white and black streaks on the nose; eyes large, black, and lustrous. The horns in the female are more slender, and the points are turned inward; the mammae are two. This species seems to be confined to the N. side of the Atlas mountains, Egypt, Abyssinia, Syria, Arabia, and S. Persia. They feed generally at dawn and at evening, approaching water, it is said, only once in 24 hours; they are hunted in various ways, and their flesh is excellent; they furnish food to great numbers of carnivorous animals. The *kud* (*G. kudu*, H. Smith) is by some considered a mere variety of the gazelle; it is about the same size, but the head is longer, the horns more robust and longer, the orbits larger, the eyes fuller, and the geographical distribution to the south of the Atlas; the habits and general

disposition of the colors are the same as in the gazelle. The *corinna* of central Africa, described by Adanson, appears to be one or the other of the preceding species. Other gazelles are the *m'hor* of Mr. Bennett, and the *nanguer* of F. Cuvier, which are also supposed by many to be varieties of the *G. dorcas*. Sömmering's gazelle (*G. Soemmeringii*, Rüpp) is a very beautiful and delicate creature, about 2½ feet high at the shoulder; the color above is a reddish-gray isabella color, the buttocks, lower parts, and inside of the limbs white, and the median line of the forehead to the nose brownish black; it inhabits N. E. Africa.

**GAZETTEER**, a cyclopædia of geography. Stephen of Byzantium (probably in the 6th century) wrote a work of this kind, entitled *Ethnica*, of which only an epitome remains. The earliest noticeable modern gazetteers were by Ferrari (Milan, 1627), Baudrand (Paris, 1681-'2), Laurence Echard (London, 1708-'4), and Thomas Corneille (Paris, 1708), which were all superseded by that of La Martinière (10 vols., the Hague, 1726-'30). An abridgment of this was made by Ladvocat (1747), under the assumed name of Vosgien. Of more recent gazetteers, the principal are those of Hübner, *Staats-, Zeitungs-, &c., Lexikon* (1804; revised and enlarged by Rüder, 1824); Hassel, *Allgemeines geographisch-statistisches Lexikon* (1817); Stein, *Zeitungs-, Post- und Comtoir-Lexikon* (1818); Möller, *Geographisch-statistisches Lexikon* (1847); Ritter, *Geographisch-statistisches Lexikon* (4th ed., Leipsic, 1855); Hoffmann, *Encyclopædie der Erd-, Völker- und Staatenkunde* (Leipsic, 1855 et seq.); Kramers, *Geographisch Woordenboek* (Gouda, 1858); Castro, *Gran dizionario geografico* (Milan, 1855); *Dictionnaire géographique universel, par une société de géographes* (10 vols., Paris, 1828-'38); Bescherelle, *Grand dictionnaire de géographie universelle, ancienne et moderne* (4 vols., Paris, 1856-'7); J. R. McCulloch, "Geographical Dictionary" (2 vols., new ed., London, 1851; a New York edition, under the care of D. Haskel, had appeared in 1848); A. K. Johnston, "Dictionary of Geography" (London, 1851, 2d ed. 1855); W. G. Blackie, the "Imperial Gazetteer" (2 vols., Glasgow, 1855); the "Gazetteer of the World," published by Fullarton and co. (7 vols., Edinburgh, 1856); J. E. Worcester, "Universal Gazetteer" (2d ed., Boston, 1828); J. C. Smith, "Harper's Statistical Gazetteer of the World," (New York, 1855); J. Thomas and T. Baldwin, "Lippincott's Complete Pronouncing Gazetteer of the World" (Philadelphia, 1856), and "Gazetteer of the United States" (Philadelphia, 1854); and R. H. Fisher, "Statistical Gazetteer of the United States" (New York, 1858).

**GEAUGA**, a N. E. co. of Ohio, drained by the sources of Cuyahoga, Grand, and Chagrin rivers; area, about 480 sq. m.; pop. in 1850, 17,827. It has an undulating surface, admirably adapted to pasturage. Sandstone and iron are abundant. The county produced in 1858 217,144 bushels of Indian corn, and 48,322 of

wheat. In 1850 there were 6 corn and flour mills, 6 saw mills, 2 woollen factories, 4 tanneries, 1 iron foundry, 2 newspaper offices, 40 churches, and 4,886 pupils attending public schools. Capital, Chardon.

GEBER, ABOU MOUSSAH DJAFAR AL SOFI, founder of the school of Arabian chemists in the 9th century A. D., born in Thus, Persia, or, according to Abulfeda, in Harran, Mesopotamia. He is reckoned by Oarden as one of the 12 subtlest geniuses of the world, and his authority was unrivalled among the alchemists of the middle ages. His works, only fragments of which remain, contain the germs of the belief in the transmutation of metals, and in the universal elixir, which he thought to be a solution of gold. They also contain curious and still useful details concerning the nature, fusion, purification, and malleability of metals. They have all been translated into Latin (Dantzic, 1682), and into English by Russell (London, 1678).

GECKO, a name applied to a family of nocturnal lizards (*ascalabota* of Duméril and Bibron), numerous in species, living in warm climates, and presenting characters of form, structure, and habits which make the group as distinct as that of the crocodiles or chameleons. Their size is small; the head wide, flattened, covered with scales, with marginal scutes at each jaw; the neck short; the body depressed, stout, thickest in the middle, without crest on the back, generally covered with small imbricated scales and scattered tubercles, smallest on the back; the tail moderate; the feet 5-toed, the thumb often very short, and the other fingers equal, flattened below and lobed at the end; the tongue is fleshy, short, slightly protractile, free and scarcely emarginate at the tip; the eyes very large, covered as in serpents by a transparent immovable lid, behind which these organs have free motion; the pupil vertical, and often linear as in nocturnal animals generally; the opening of the ear is distinct, and the tympanum depressed; there are no teeth on the palate, those of the jaws thin, entire, numerous, with cutting edges, and adhering to the internal margin; femoral pores occasionally present, but usually absent; beside the leaf-like expansion at the end of the toes, nails are generally present, capable of retraction, as in the cats, the latter favoring their progression in climbing on smooth surfaces. The tail is shorter than in ordinary lizards, and the flatness and width of the head give them somewhat the aspect of salamanders; the mouth is deeply cleft, and the widely expanded jaws may be kept open for a long time, the cavity of the mouth being shut off from the throat by the application of the base of the tongue to the posterior part of the palate; from the shortness of the robust legs, the abdomen touches the ground in walking. This reptile is mentioned by Aristotle, and the modern name *gecko* is derived from the sound made by some of the Indian species, resembling the click of the hostler urging on his horses, and was first given by Laurenti; this

genus was the *ascalabotes* of Aristotle, the *stellio* of Pliny, and the *tarentola* of the ancient Italians. Their colors are generally gray or yellowish, but some have brighter tints which can be varied like those of the chameleon, probably by the same changes in the reflecting surface of the integuments; the sides of the body, limbs, and tail are sometimes fringed with membranes. In many species there is a line of pores along and under the thighs, from which a fatty moisture distils; some species of a genus will have these, and others not, and sometimes one sex only will be destitute of them. The tail, as in salamanders, is ruptured with facility, and is reproduced readily, often in a deformed manner. Their food consists of larvæ and insects, which they pursue into their leafy retreats; the imbricated plates on the bottom of their feet, like those of the tree frog and flies, enable them to climb smooth walls and similar surfaces, and to adhere to them with the back downward; by means of their sharp, curved, retractile claws, they can ascend trees and rough objects with ease and rapidity; from the quickness of their movements, their suddenly becoming motionless, and remaining so for a long time, and their resemblance to the colors of the substances on which they are placed; they are difficult to obtain, and not easy even to see; they hunt for food both by day and night; the same qualities which fit them for the pursuit of living prey enable them to escape their bird enemies. These reptiles are very generally objects of horror and repugnance, from the prevalent but erroneous idea that they exude a poison so powerful and subtle that their touch, a drop of their saliva, or a scratch with their nails, will produce leprosy and other cutaneous diseases, often ending fatally. They like to approach human habitations, as there they find in greatest abundance their insect food; their ill-shaped body, smooth or spiny, dull colors, large head, their enormous staring eyes, rapid and silent motions, and familiarity in houses, render them very disagreeable, but by no means dangerous inmates. Found in all warm climates, they are very uncommon in Europe (2 or 3 species), and most abundant in Asia, America, and Africa, and the Pacific islands are well supplied with them. They have been divided into genera according to the form and structure of their toes; but these generic characters in a family so nearly alike in its members are very unsatisfactory, and great and unnecessary multiplication of genera has been the result of the labors of various systematists. The arrangement of Duméril and Bibron, which differs but little from that proposed by Cuvier in 1829, is as follows: 1. *Platydaetylus* (Dum. and Bibr.), with toes enlarged for their whole length, with finely plicated stris beneath; of those species having the feet cloven, some have all the toes unarmed, others all unguiculate, others with the thumb only or with the 2d and 3d fingers unarmed; of those with palinated feet the fingers are either all unguiculate

lated, or the thumb alone is unarmed; there are about 20 species, of which the varieties have been made into genera by Fitzinger, Wiegmann, Kuhl, and others. 2. *Hemidactylus* (Ouv.), with the toes widened only at the base into an oval disk striated beneath; about 15 species. 3. *Ptyodactylus* (Ouv.), with the toes enlarged at the extremity into a cleft oval disk, striated below like a fan, and all armed with claws; destitute of femoral pores; 4 described species. 4. *Phyllodactylus* (Gray), with the terminal disk as in the last genus, except that 2 plates take the place of the fan-like stris; 8 species. 5. *Spheroedactylus* (Ouv.), small species, with the toes ending in a single, simple, smooth cushion; nails absent, as well as femoral pores; 3 species. 6. *Gymnodactylus* (Spix), with toes not widened, but striated beneath; 12 species. 7. *Stenodactylus* (Fitz.), with simple toes, granulated below, and all provided with nails; with a single species.—As specimens of this animal the following may be mentioned: The eyed gecko (*Pl. ocellatus*, Oppel.), from southern Africa, is one of the smallest species, being only  $\frac{2\frac{1}{2}}$  inches long, of which the head is  $\frac{1}{4}$  and the body  $\frac{3}{4}$ ; the color above is brown with white spots, beneath white, spotted with black on the throat; it is called *geitje* by the natives. The cepedian gecko (*Pl. cepedianus*, Ouv.), from Madagascar and Mauritius, is about 7 inches long, of a rose color marbled with blue; the thumb of the fore foot is a short stump. The smooth gecko (*Pl. theconyx*, Dum. and Bibr.), from the West Indies and South America, is about 5 inches long, has very fine scales, and is gray marbled with brown. The *Pl. Seychellensis* (Dum. and Bibr.), of a fulvous color, is 10 inches long. The wall gecko (*Pl. muralis*, Dum. and Bibr.; *Pl. sacetanus*, Aldrov.) is 6 inches long, of a grayish color, the upper part of the body and head rough; this species occurs all around the Mediterranean, and conceals itself in walls and stone heaps, delighting to cover itself with dirt and filth; it likes the heat of the sun, and though beneficial in houses by destroying insects and vermin, is generally feared and persecuted, like the toad and other useful creatures. The common gecko (*Pl. guttatus*, Ouv.) of the continent of Asia and its archipelago is 11 inches long, of which the tail is about half; the general color is dark gray, with whitish spots. A common gecko in the walls of houses in the West Indies is the *H. mabouia* (Ouv.), about 5 inches long, of a grayish color marbled with brown, with the posterior half of the tail ringed with black. The house gecko (*Pt. Hasselquistii*, Dum. and Bibr.), found in Egypt, Arabia, and countries bordering on the eastern part of the Mediterranean, is about  $5\frac{1}{2}$  inches long, of a reddish gray color, spotted with white and pale brown, and whitish below; it is common in the damp and gloomy parts of houses, and is called at Cairo "father of leprosy," from the belief that it communicates this disease to persons who partake of food over which this animal has walked the poison being supposed to ex-

ude from the lobes of the toes. The truth is, that neither its bite nor any of its secretions are hurtful to man or beast; cats pursue it and eat it eagerly; the Egyptians are said to keep it from their kitchens by large quantities of garlic. The fringed gecko (*Pt. fimbriatus*, Cuv.), from Madagascar, attains a length of 12 inches. The spitting gecko (*Sph. sputator*, Ouv.), from St. Domingo and the West Indies, is a little more than 2 inches long, banded with black and white; it receives its name from its supposed habit of ejecting its saliva when irritated, causing swelling and inflammation of the parts which it touches; this is a mere fable. The flat-tailed gecko (*G. phyllurus*, Dum. and Bibr.) has the tail flattened like a leaf, and the upper part of the body rough with spines; it is a native of Australia, and is about 9 inches long, dark gray marbled with blackish above, and whitish beneath.

GED, WILLIAM, a Scottish mechanic, and the inventor of stereotyping, born in Edinburgh about 1700, died Oct. 19, 1749. He was originally a goldsmith in his native city, and is said to have first attempted stereotyping in 1725. In 1729 he entered into partnership with William Fenner, a London stationer, in order to carry his invention into regular practice, Fenner advancing the necessary capital on condition of receiving half the profits. Other partners subsequently joined the firm. In 1730 the company contracted with the university of Cambridge for the printing of Bibles and prayer books by stereotype, and invested a large sum of money in the speculation; but when only two prayer books were finished the contract had to be surrendered, owing, as Ged alleged, to the malignant mismanagement of the pressmen, who were hostile to the innovation, and the disreputable conduct of some of his associates. In 1738 he returned to Edinburgh, where in 1736 he completed an edition of Sallust, which was not published till 1744, and was inaccurately executed. At the time of his death Ged was about to form a partnership in London with his son James for the purpose of attempting once more to test the value of his invention.

GEDDES, ALEXANDER, a Scotch Roman Catholic ecclesiastic, born in Arradowl, Banffshire, Sept. 4, 1737, died in London, Feb. 26, 1802. He was educated at the Scotch college in Paris, where he distinguished himself as a theologian and linguist. In 1769 he was appointed pastor of a Catholic congregation at Anchinhalrig in his native county. In 1780 he removed to London with the intention of commencing a new translation of the Bible for the use of English Catholics; and under the patronage of Lord Petre, who allowed him £200 a year, and provided him with all the necessary authorities, he applied himself to his work. His original design was to make the Vulgate the basis of his translation, but he soon abandoned this idea, and substituted the Hebrew and Greek versions in its stead. The 1st and 2d volumes of this translation appeared in 1792 and 1793; the 3d,



which was merely a commentary on the Penta-teuch, in 1800; the rest of the work was never published. This translation is a tolerable performance, although the commentary is remarkable for the superficial and frivolous tone in which it advances rationalistic ideas. Immediately after the publication of his commentary, the reading of his work was forbidden to the faithful, and the author was deposed from the priesthood. A life of Geddes, containing a catalogue of his works, has been written by Dr. John Mason Good (1 vol. 8vo., London, 1808).

GEEFS, GUILLAUME, a Belgian sculptor, born in Antwerp, Sept. 10, 1806. After completing his studies he went to Paris, where he spent some time in the studio of M. Ramey. Soon after returning to Belgium he obtained a commission from the Belgian government to execute a monument to the memory of the victims of the revolution of 1830. The execution of this work, and of a monument to Count Frederic de Merode and a statue of Gen. Belliard, both of whom fell in that struggle, placed Geefs at the head of his profession in Belgium. He is also eminent as a poetic and imaginative sculptor, as is proved by his "Geneviève de Brabant," "Francesca di Rimini," "Fisherman's Daughter," "Infant St. John," and many similar works. Beside the monuments above alluded to, M. Geefs has executed a statue of Rubens which stands in the Place Verte at Antwerp, a colossal marble statue of King Leopold for the vestibule of the national palace, and a monumental statue of Charlemagne for the church of St. Gervais at Maestricht.

GEELONG, a town of S. Australia, and next to Melbourne the most important place in Victoria colony, is pleasantly situated in Grant co., on the S. W. shore of Port Philip, at the head of Corio or Geelong bay, 40 m. from Melbourne, in lat. 38° 8' S., long. 144° 25' E. Since the discovery in 1851 of the gold fields of Ballarat, 40 m. from Geelong, the town has rapidly risen in importance, and the population increased from 2,000 in 1846 to 28,338 according to the census taken on March 29, 1857. Its revenue increased from £2,785 in 1851 to £10,697 in 1852. The total valuation of ratable property in 1857 was £276,718. The quantity of gold dust brought to Melbourne and Geelong in 1851 was 2,829,875 ounces. In the early part of that year serious riots took place at the diggings near Geelong, in consequence of the miners resisting the payment of the license fees. This led to the abolition of the license fee and to the imposition of a tax on the export of gold. Geelong is also a chief centre for the wool trade, and carries on an extensive trade by means of the small but fine harbor of Corio, which is enclosed by picturesque green cliffs. Large vessels discharge at Port Henry, 10 m. down the bay. The surrounding country is very beautiful, the soil fertile, and the climate healthy. The town is adorned with numerous cottages and gardens, possesses an industrial school, a chamber of commerce, churches, schools, and charitable in-

stitutions. It is well supplied with water. Telegraphic communication has been established between Geelong, Melbourne, Ballarat, and since 1857 also with the other gold fields. A railway to Melbourne is in construction.

GEER, KARL DE, baron, a Swedish naturalist, born in Finspang in 1720, died in Stockholm, March 8, 1778. He studied at Utrecht and Upsal, was a pupil of Linnæus, and published *Mémoires pour servir à l'histoire des insectes* (8 vols. 4to., Stockholm, 1752-'78), containing descriptions of more than 1,500 species, accompanied with excellent illustrations. To this the *Genera et Species Insectorum* of Retzius (Leipzig, 1778) may be regarded as a supplement. De Geer also published several other zoological works. By the king of Sweden he was raised to the dignities of marshal of the court and commander of the order of Vasa. He was a member of the academy of sciences at Stockholm, to which he left his valuable collections in natural history.

GEERTS, CHARLES HENRI, a Belgian sculptor and wood-carver, born in Antwerp in 1808, died in 1855. He was professor at the academy in Louvain. Among his principal works are "Christ sinking under the Weight of the Cross," in Leyden; a Madonna in the museum of Brussels; the "Mater Dolorosa" and "St. John" in Bristol. At the great exhibition of 1851 he gained a prize medal for his chief contribution, the "Coronation of the Virgin."

GEFLE, a seaport town of Sweden, and capital of the län or province of Gefleborg, situated near the gulf of Bothnia and the mouth of the river of its name, 92 m. N. N. W. from Stockholm; pop. 9,000. Its most important public edifices are the castle, town hall, prison, gymnasium, and church. The chief manufactures are tobacco, linen, sail cloth, cards, and leather. There are two ship yards and an excellent harbor.

GEHENNA (Heb. *Ghe-Hinnom*, the vale of Hinnom), a valley adjacent to Jerusalem, on the S. and S. W., also called Tophet, and often mentioned in Scripture in connection with the idolatrous rites of Moloch, which were there celebrated. From the abhorrence with which the Jews after the captivity regarded this worship, the valley was made the common sewer of the city, and a receptacle for all its refuse, which was there consumed by fire. In the New Testament the name is transferred by an easy metaphor to hell.

GEIBEL, EMANUEL, a German poet, born in Lübeck, Oct. 18, 1816. He became associated in 1836 at Berlin with Ohamisso, Gaudy, and Kugler. In 1852 he became professor of aesthetics in the university of Munich. He has written sonnets, dramas, operas, and other poems, marked by delicacy of sentiment and a religious tone. In 1857 appeared his tragedy of Brunhilde, and in 1858 a 4th edition of his *Neue Gedichte*.

GEIGER, ABRAHAM, a German rabbi and orientalist, born in Frankfort-on-the-Main, May 24, 1810. He pursued his studies in the uni-

versities of Heidelberg and Bonn, gaining in the latter the prize for a dissertation on the Hebrew sources of the Koran. In 1832 he became a rabbi at Wiesbaden, and he is now (1859) rabbi at Breslau. His efforts to effect reforms in Judaism made him for some years the most conspicuous Jewish theologian in Germany. From 1835 to 1847 he edited the *Zeitschrift für Jüdische Theologie*, beside which he has published several critical works. His *Lehr- und Lesebuch zur Sprache der Mischna* appeared at Breslau in 1845, and his *Leon da Modena* and *Jüdische Dichtungen* in 1855.

GEIJER, ERIC GUSTAF, a Swedish historian and poet, born in Ransäter, Wermeland, Jan. 12, 1783, died in Upsal, April 24, 1847. In his *Minnen* ("Reminiscences") he has given vivid descriptions of the wild district of his birth, with its forests and torrents, the smoke and din of his father's foundry, and the simple, earnest, and upright inhabitants, who pleased him more in his school days than all his learned masters. At the age of 16 he was sent to the university of Upsal, where for a time he followed diligently the routine of study, though he expressed his conviction that the solemn forms and disputations in vogue would become the laughing-stock of future ages. He neglected to take his degree at the proper time, and consequently in 1803 was refused a tutorship in a distinguished family which his friends had sought to obtain for him. "This," he says, "was my first experience of the worth of a name and a reputation. It seemed to me that the entire world had their eyes fixed on me; my whole being was in commotion." To restore his reputation he at once determined to contend for the next prize of the Swedish academy for excellence in composition. With very meagre authorities, and with scarcely paper enough for his manuscript, he wrote a eulogy upon the Swedish administrator Steno Sturé, which obtained the first prize. Among the young men whose acquaintance he now formed was the poet Tegner. Devoting himself with ardor to study, he was graduated master of arts in 1806, and after a short visit to England was appointed in 1810 lecturer (*docent*) upon history at Upsal, and was a second time crowned by the academy for an essay on the question: "What advantages may be derived from the imagination in the moral education of man?" In 1811 he was one of the 12 young men who founded the Gothic society, the object of which was to nurture a national spirit and national manners, and to derive the materials of literature, not from classical and foreign sources, but from the ancient traditions of the North. The new school was quickly divided into two parties, the Gothic and more moderate party, of which Geijer and Tegner were the chiefs, and whose organ was the *Iduna*; and the Phosphorist party, so called from its organ the *Phosphoros*, of which Atterbom was the chief, and which unfurled the banner of a wild and unbounded romanticism. In the early numbers of the *Iduna*, which appeared from

1811 to 1824, Geijer published his finest poems, as the "Viking," the "Last Scald," and the "Last Champion," which became immediately popular. His song of the "Charcoal Boy" is still a favorite throughout Sweden. In 1814-'16 he united with Afzelius in preparing a collection of Swedish popular ballads, and after most diverse studies of philosophy, æsthetics, history, and theology, was in 1817 elevated to the professorship of history at Upsal to succeed Fant. His lectures had an almost unprecedented success, attracting not only students but the most cultivated ladies and gentlemen of Upsal. He prepared them with great care, founding his wide syntheses and striking epitomes on a thorough collation of sources. Music was a powerful assistant to him in every kind of labor, and he was wont to play on the piano as a preparation alike for writing a lecture or a song. Liberal both in politics and religion, he was twice offered a bishopric, which he declined, and twice represented the university of Upsal in the diet. His heavy censure of the nobility, and of the part which they played in the early history of Sweden, gave rise to a lively controversy with Fryxell. Many of his minor pieces, in which he treated political, literary, and religious questions, are remarkable, but his chief distinction is as the historian of Sweden. He was appointed with Fant and Schröder to edit the collection of *Scriptores Rerum Suecicarum Medii Ævi* (2 vols., Stockholm, 1818-'25). His *Seva Rikes Hæfder* ("Annals of Sweden," Upsal, 1825; translated into German, 1826) is a collection of dissertations on the early history and antiquities of the kingdom. His principal work is the *Svenska Folkets Historia* ("History of the Swedish People," 8 vols., Örebro, 1832-'6; translated into German by Leffler, Hamburg, 1832-'6; into French by Lundblad, Paris, 1840; and into English by Turner, London, 1845), which extends only to the death of Queen Christina, but has been continued by Carlson. The work of Fryxell is also regarded as a supplement to it. At once a history of ideas, of manners, and of institutions, it is remarkable both for eloquence and learning, for its patriotic tone, synthetic views, and suggestive power. Among his minor publications are a "Sketch of the State of Sweden from Charles XII. to Gustavus III." (Upsal, 1839), and a "Life of Charles XIV. John," or Bernadotte (Upsal, 1844). A complete edition of his works was published at Stockholm (13 vols., 1849-'55).

GEINE (Gr. γῆ, the earth), a name formerly given by Berzelius to the insoluble residue left by treating the substance he called humus with alkaline solutions. Dr. Samuel L. Dana considered it the same as humus, the decomposed organic matter of the soil, and regarded it as a definite substance which it is the object of the cultivator to produce in the compost heap. His views are fully presented in the "Final Report on the Geology of Massachusetts," by Prof. Hitchcock (vol. i. p. 87 et seq., and p. 121 et

*seq.*), and in the table of about 150 analyses of soils, commencing on p. 41, he presents the proportions of geine, soluble and insoluble, these contained.

GELA, an ancient city of southern Sicily, on a river of the same name, now Fiume di Terra Nuova, founded (about 690 B. C.) by a colony of Rhodians from Lindus and Oretans. It soon became flourishing, and was the parent of Agrigentum, now Girgenti, which afterward surpassed the might of the mother city. The popular constitution of Gela was overthrown by Cleander, who was the first of its tyrants. His brother Hippocrates succeeded him, and extended its influence and power over the greatest part of Sicily. His successor Gelon's transfer of the seat of his power and of a part of the inhabitants of Gela to Syracuse (485), his brother Hiero being made governor of the former, caused its decay; and its desolation was completed by Phintias, tyrant of Agrigentum, who removed its inhabitants to a new town, to which he gave his name (280). In the time of Augustus it was already in ruins, which are still visible in the vicinity of Terra Nuova.

GELATINE, a jelly extracted from animal tissues, by boiling them in water. Isinglass and glue are varieties, an account of which will be included in this article. In its purer forms, as the commercial gelatine and isinglass prepared for food, it is in colorless, transparent, thin sheets or shreds of semi-horny texture, without taste or smell, varying in toughness according to the particular tissue from which it is prepared. It dissolves in hot water, and becomes a jelly of stiffness proportionate to the quantity dissolved. The colder the temperature the smaller is the quantity of water required for the jelly to appear. Exposure of the solution to greater heat than 212° F., as also frequent repetition of the process of liquefying and gelatinizing, lessens the consistency of the jelly in proportion to the heat applied and the length of time the solution is kept warm. The property of gelatinizing is also partially lost if the solution begins to sour. The common method of keeping and employing glue in the glue-pot made to prevent an accession of temperature above 212° F., is based upon this property. The tendency to putrefaction in glue may be prevented by adding acetic acid, which does not affect its adhesive quality. The presence of gelatine in a solution is indicated by the dense white precipitate caused by the addition of a solution of tannin, such as that contained in the solution of galls. Reciprocally gelatine is a test of the presence of tannic acid. Alcohol does not dissolve gelatine; but added to its aqueous solution, which should be warm and somewhat concentrated, the gelatine coagulates in a white, elastic mass, which strongly adheres to the vessel. Gelatine is also insoluble in ether and the oils. The addition of alcohol to gelatine in a state of jelly causes it to part with a portion of its water and contract greatly. A print has been taken upon a thin film of the jellied substance,

which being then reduced in size by this means was made to give upon stone a new impression of smaller but proportional dimensions. An enlarged print may be obtained by steeping the gelatine in cold water after it has received an impression. Gelatine is believed to consist, in 100 parts, of carbon 13 equivalents = 50 per cent.; hydrogen 10 = 6.41; oxygen 5 = 25.64; nitrogen 2 = 17.95. Various methods are in use for preparing the gelatine sold for making jellies, blanc-mange, &c. For the best article the skins of calves' heads and other thick pieces which are unfit for the manufacture of leather are first freed from hair and thoroughly cleaned of flesh and fat, and well washed. They are then reduced by cutting machinery to small pieces or to a pulp, cold water being allowed to run through the pieces during this operation in order to remove all impurities. The pieces of skin or pulp are differently treated by different manufacturers in order to obtain the solution most readily, some employing the mechanical force of rollers in conjunction with the application of a temperature varying from 150° to 212°. When the solution is obtained it is clarified with some albuminous matter, as the white of eggs or ox blood, and after settling is drawn off upon shallow coolers, as plates of glass or slates. When partially dry, so that it can be cut into convenient shapes for handling, it is removed upon nets or placed in a vacuum drying apparatus to complete the process of desiccation. In the course of the preparation the article is flavored with essences. The French gelatine is said to be whiter than the English in consequence of their calves being killed at an earlier age. The hides of the ox are sometimes used as well as those of calves. Bones and ivory also are made to yield gelatine by subjecting them, when crushed, to water boiling at high temperatures in a digester, or to the action of steam gradually raised to the pressure of 33 pounds to the square inch, and thus kept for 3½ hours. By this means their soluble portions are taken up, and the earthy matters, about 60 per cent. of the whole weight, are left behind, together with a soapy substance produced from the fat and lime of the bones. This residue is used for the manufacture of bone black, or the preparation of phosphorus, and is beside an excellent material for composts. The manufacture of gelatine has been largely carried on in France by first removing the earthy salts from bones by digesting them for many days in dilute hydrochloric acid, and afterward in boiling water. For this use the more porous bones of the heads of animals were preferred, and the clippings of button manufacturers. The acid liquors contain the phosphate of lime of the bones in the form of a soluble biphosphate, from which the phosphorus is obtained by the manufacturers of this article, and they also contain ammoniacal products, which render them valuable for composts. For a long time gelatine was largely employed in the hospitals and pauper establishments of Paris, as a cheap and,

as it was believed, very nutritive material for soups. Its value for this purpose was at last questioned, and the commission appointed to investigate its qualities reported unfavorably. (See ALIMENT.) Great skill, however, had been attained in the methods of manufacture, and this is still available in the extraction of gelatine from bones for other purposes. Even the dry bones of the mastodon had been made by the acid process to yield the gelatine for a soup. In the practice of 11 years at the hospital of St. Louis at Rheims the production from 100 parts of dried bones was as follows: gelatine 38.904, fat 7.216, bone residue 64.580. As the bones contained an average of only 30 per cent. of gelatine and 10 of fat, the process was much more perfect than that of the glue manufacturers, who obtained of gelatine only from 10 to 15 per cent. of the weight of the bones they employed. This is ascribed to the moderate pressure of steam and reduced temperature, not exceeding 223° F., employed in the digesting process.—But though gelatine is insufficient of itself to support life, its almost universal use in some form of food attests its importance as an article of diet. It also finds numerous other uses, as for the clarifying of liquors, the manufacture of cements, as a chemical test for tannin, and in pharmacy for coating pills and forming pouches or capsules in which disagreeable medicines may be concealed and swallowed without disgust. It is also applied in the dressing of silks and other stuffs. It is made by the French into thin transparent sheets called *papier glacé*, which are used for copying drawings; and they also prepare from it artificial flowers richly colored to imitate the natural specimens, or presenting the appearance, in their glittering and semi-transparent substance, of flowers wet with dew or drenched with rain. Another application of gelatine is for taking casts or forming moulds of objects presenting complicated forms, for retaining which plaster is not sufficiently adhesive. A series of casts in imitation of ivory were produced in this substance in 1844 by M. Franchi, for which the prize of the London society of arts was awarded in 1846. He afterward obtained gelatine casts from moulds of the same substance, the lines being perfectly retained in their original sharpness. He also took casts in gelatine from flat models, which he applied to cylindrical bodies, thus saving much expense in the carving or construction of intricate models.—*JARRELL* is the best known form of edible gelatine. It is the dried air bag, sound, or swimming bladder of fishes, known to the ancients by the name of *ichthyocolla* or fish glue, and often alluded to by Dioscorides and Pliny. In different parts of the world this product is obtained from different fishes, and the isinglass of commerce is consequently of various qualities. The best is found among the varieties imported from Russia, particularly that which is brought to St. Petersburg from Astrakhan, and said to be obtained from the sturgeon called the beluga (*aci-*

*penser huso*) of the Caspian sea and the rivers which flow into it, a species which attains a length of 25 feet. According to some authorities the sound is cut open, washed, and then exposed to the air, the inner silvery membrane outward. This membrane is then stripped off, placed in damp cloths and kneaded in the hands. Taken out and dried, it forms the leaf isinglass; folded like sheets of paper, it is the book isinglass; wound in the form of a horse shoe or lyre around 8 pegs, it forms the varieties known as long or short staple. According to Martin, the inner membrane is removed by beating and rubbing, and the thicker membrane is preserved. The isinglass called Samovey is brought from Taganrog. The leaf, book, and short staple of this locality are all of inferior quality. The varieties from the Ural and Siberia are better. The Brazilian isinglass, imported from Para and Maranhão, is obtained in various forms distinguished as pipe, lump, and honeycomb. It appears to be the product of different kinds of fish, and to be prepared with little care. It is largely used in brewing establishments for fining the liquors; and though it is too impure for domestic uses, there is no doubt it is largely employed to adulterate the better articles. Its presence may be detected by the isinglass failing to dissolve readily and completely in hot water, and by its forming with this an opalescent and milky jelly in which may be observed the insoluble shreds common to the Brazilian article. Its smell also is often disagreeable, while that of the pure Russian isinglass is as inoffensive as the odor of sea weed, which it somewhat resembles. The isinglass of New York and New England is obtained from the sounds of the codfish (*morrhua vulgaris*) and of the common hake (*phycis Americanus*). They are macerated in water, and afterward rolled out in long strips of a few inches in width. The quality of the isinglass is poor, its solution not readily obtained, and its color dark. It is used for the same purposes as the Brazilian. Other varieties are produced in other maritime countries.—All isinglass has to undergo a process of refining before it is fit for making jellies, blanco-mange, &c. The best beluga leaf is imported in sheets of circular form, the most perfect of which are sometimes 2 feet in circumference, and weigh from 8 to 16 oz., in some instances reaching even 4 lbs. These are carefully picked over, and all the discolored parts are cut away and put aside for uses of less importance. The assorted leaf is then rolled out by machinery and passed through successive pairs of iron rollers, until it is converted into thin ribbons of uniform width. These are afterward by other machinery slit into fine shreds. Inferior sheet gelatine is sometimes introduced between two sheets of isinglass before rolling and thus incorporated with it. Isinglass, being a nearly pure gelatine, should have little or no color; and being commonly prepared without exposure to high degrees of heat, it should be tougher and more

elastic than the other forms of this substance. It should therefore make a most adhesive cement, and such is found to be the case. It is for this purpose swollen with cold water, and then placed in diluted alcohol. The vessel containing it is then put into cold water, which is to be heated to boiling. The jelly forms the cement, which may be kept from mouldiness and other change by the addition of a few drops of any essential oil. It is known as the "diamond cement," and is also the adhesive substance of court plaster. Gum ammoniac is sometimes introduced, as by the Turks, who use the cement for fastening precious stones, mending broken porcelain, glass, &c. Isinglass has also been used for the window lights of vessels, being covered with a transparent varnish which is not affected by moist air. Beside the methods already stated of detecting fraudulent mixtures with isinglass, the microscope may be used to render the different textures apparent. The ash of isinglass seldom exceeds  $\frac{1}{2}$  per cent. and is of a red color; that of gelatine is white, and in quantity not less than 8 per cent.—GLUE, the most impure form of gelatine, is obtained from a great variety of refuse animal matters, as fragments of hides, scraps of leather which has not been tanned, skins from the furriers, hoofs, horns, tendons, intestines; in fact, almost any part of animals can be advantageously used in this manufacture. Bones are employed by the French as in the manufacture of edible gelatine; but when intended for glue, the process of dissolving out the earthy matters with hydrochloric acid is preferred to the steaming, the latter requiring a degree of heat which diminishes the adhesive quality of the glue. The animal matters are first subjected to a process of maceration in lime water for several weeks or months, by which their putrefaction is prevented, and they are rendered soft and more readily acted upon in the subsequent digesting operation. The lime water is frequently renewed in the vats. When taken out they are rinsed with water, and laid upon a sloping surface to drain and dry, where they are turned several times a day. By this exposure the quicklime is carbonated, and what remains attached is thus rendered harmless to the glue, from which it is afterward separated, together with the fatty matters, in the clarifying. The digestion is conducted in large boilers containing water, within which the animal matters are introduced in an open-mouthed bag or net made of rope, the contact of which with the inner sides of the vessel is prevented by a light frame of iron which serves as a lining to the boiler. The contents are occasionally stirred and pressed down with poles, and added to as their bulk diminishes by boiling. When samples of the solution are found to gelatinize on cooling, the bag with its contents is drawn up out of the boiler by a large permanent windlass, which is fixed for the purpose at a considerable height above the boiler, and which is rolled by the machinery. By winding the bag as closely as possible to the shaft of the

windlass its contents are compressed, so that they rapidly drain and the liquid portions are made to fall back into the boiler. The more solid contents by a second boiling furnish more gelatine, which may be made into size, or the solution may be used to boil a fresh portion of animal matters. The final refuse is used for manure. The liquid in the boiler is evaporated to a proper consistency, and is then drawn off into a vessel called a settling-back, in which it can be kept liquefied by heat. In this the solid impurities settle, and the others are separated by clarifying the liquid with alum or other fining substances. This process completed, the glue is run out into coolers, which are wooden boxes about 6 feet long, a foot wide, and 6 inches deep. In these, if the room is cool, it solidifies sufficiently in the course of 12 to 18 hours to be cut with spades into cubical blocks. Each one of these is placed in a wooden box, made with open slits in the back to admit a wire, by which the blocks are cut into slices. These are placed upon nets stretched in wooden frames, and are then taken to the drying ground, where, protected by a temporary roof, the frames are piled up, so that the air can circulate through them. The whole require turning several times a day to expose all portions equally to the air. In this part of the manufacture the glue is particularly liable to injury from the weather. Too great dampness will make it mouldy; in too dry weather it will warp out of shape; in too hot weather it will soften and run upon the nets, or even flow through them; frost will cause it to crack in every direction by the freezing of the water within it; and a thunderstorm will prevent its hardening. The days of moderate weather of spring and autumn are the best for the drying operation. But this is not completed in the open air; the glue is removed to lofts and left for weeks or months; and as the slices become mouldy and soiled they are scrubbed with a brush and hot water and set up to drain. At last they are exposed to the high temperature of artificially heated rooms, by which the glue is properly hardened. The strongest glue is in thin sheets of a dark color, free from cloudy spots, and partially transparent. It swells in cold water without dissolving, and returns to its original size on drying. When used, it should be broken into small pieces and left for 24 hours in cold water; it may then be slowly melted by heat with frequent stirring. The jelly which forms on cooling may again be liquefied by heat without adding more water; but on frequent reheating it dries less readily, and partially loses its adhesive quality for which it is chiefly of value. Allusion has already been made to the provision furnished in the glue pot against its being exposed to a higher heat than that of boiling water. It should also be protected against a freezing temperature.—A glue that is not liable to be affected by dampness, and is a very tenacious cement, is made by immersing gelatine or glue, after it has been swollen in

cold water, in linseed oil and heating it; also by dissolving isinglass in skim milk instead of water. The quality of glue may be judged of by the quantity of water which the dry glue will absorb in 24 hours. The best glue kept immersed in water of the temperature of 80° F. has absorbed 12 times its weight. Other qualities, it is said, take up a proportionally less quantity. Beside its use for cementing wood and hard substances, glue is sometimes employed by the hatter in preparing the felt bodies of hats, and by the printer as an ingredient in the composition of inking rollers, to give them flexibility. —Several varieties of glue are employed in the arts, some of which may properly be noticed here, although they are not all preparations of gelatine. By treating glue with a small proportion of nitric acid it loses its property of gelatinizing when cold, though not that of causing substances to adhere together. With acetic acid a similar effect is produced. What is called liquid glue is made by slowly adding nitric acid to the ordinary preparation of glue in the proportion of 10 oz. of strong acid to 2 lbs. of dry glue dissolved in a quart of water. The product is a strong glue, which remains in a liquid state, and may be thus kept for years always ready for use. Marine glue is a preparation of caoutchouc dissolved in naphtha or oil of turpentine, with the addition of shell lac after the solution has by standing several days acquired the consistency of cream; 2 or 3 parts by weight of shell lac are used for one of the solution. The composition is then heated and run into plates, and when used it is heated to the temperature of about 250° F. It possesses extraordinary adhesive properties, and being quite insoluble in water, it has been recommended as a material for fastening together the timbers of ships; so securely are these held by its application that it is stated they will sooner break across the fibres than separate at the joint.

GELDERLAND, or GUELDERLAND, a province of Holland, bounded N. W. by the Zuyder Zee, S. E. by the Prussian dominions, and on the other sides by the provinces of Overijssel, Utrecht, and North Brabant; area, 1,972 sq. m.; pop. in 1857, 396,421. Its surface is more hilly than that of most of the Netherlands; its climate is mild, but its soil, except in the river valleys, is poor. The principal streams are the Meuse (separating it from North Brabant), Waal, Rhine, and Yssel, on the banks of which fruit, grain, hops, potatoes, and tobacco are cultivated with considerable success, while the more sterile districts have recently been planted with timber, or are used for cattle-raising. Brewing, distilling, and the manufacture of paper, linen, tiles, and leather, are important branches of industry, and there is also an extensive transit trade. There are iron mines in the canton of Zutphen. The herring fishery is actively prosecuted on the Zuyder Zee. For administrative purposes the province is divided into the districts of Arnhem, Nimeguen, Thiel, and Zutphen. Arnhem, the capital, Nimeguen, Zutphen, and Har-

derwyk are the chief towns. Gelderland was made a county in 1070 by the emperor Henry IV., and a duchy in 1389 by Louis of Bavaria. It was governed by dukes of its own, who resided at its present capital, until 1528, when it passed into the hands of Charles V. It joined the league of Utrecht in 1576; in 1794 it was taken by the French, who held it 20 years, and in 1814 it became a part of the Netherlands. A portion of upper Gelderland (area about 400 sq. m.), including its capital Geldern (pop. 3,500), was added to Prussia by the peace of Utrecht (1713), and now forms part of the circle of Cleves in the Prussian district of Düsseldorf.

GELL, SIR WILLIAM, an English scholar and antiquary, born in Hopton, Derbyshire, in 1777, died in Naples, Feb. 4, 1836. He was graduated at Cambridge in 1798, was for a time a fellow of Emmanuel college, and was afterward sent on a secret mission to the Ionian islands. In 1814 he accompanied the princess of Wales abroad as one of her chamberlains, and was one of the witnesses at her trial, after she had become queen. He subsequently returned to Italy, where he sojourned till his death. Gell was a voluminous writer on classical antiquities. His principal works are: the "Topography of Troy and its Vicinity" (1804); "Itinerary of Greece, with a Commentary on Pausanias and Strabo" (1810); and "Pompeiana, or Observations upon the Topography, Edifices, and Ornaments of Pompeii" (1817-'19). Of the last, which has attained a greater popularity than any other of his works, a continuation in 2 vols. 8vo. was published in 1836.

GELLERT, CHRISTIAN FÜRCHTEGOTT, a German poet and moralist, born in Hainichen, Saxony, July 4, 1715, died in Leipzig, Dec. 18, 1769. He was one of the early promoters of the great literary movement which produced Schiller and Goethe. His lectures upon poetry and morals delivered at Leipzig, at first as private instructor and afterward as professor of philosophy in the university, attracted crowded audiences. Goethe in his youth was one of his disciples, but judged his ethical system to be of an effeminate tendency. He published fables, stories, letters, sacred hymns and odes, and a romance entitled the "Swedish Countess," all admirable for their *naïveté*, and which were favorably received by the public, and have been often republished. Feeble health and attacks of hypochondria paralyzed his intellectual activity in the last years of his life.

GELLIUS, AULUS, a Roman grammarian, who flourished about the middle of the 2d century A. D., supposed to have been born in Rome. He studied rhetoric there, and philosophy at Athens. He was still a youth when he commenced, during the long winter evenings spent at a country house near Athens, a compilation of extracts from Greek and Roman authors, concerning languages, antiquity, philosophy, history, and literature, interspersed with original remarks. He continued it at Rome, where he held a judicial office. His work,

named from its origin *Noctes Atticae* ("Attic Nights"), and divided into 70 books (of which the 8th is lost), though without any attempt at order or arrangement, contains a mass of materials, valuable mostly as remnants of lost ancient authors. It was published at Rome (1469), at Leyden (1706), by Gronovius, and at Göttingen (1824), by Lion.

GELON, a ruler of Syracuse, born in Gela in Sicily, died about 478 B. C. He served gallantly as commander of the cavalry, under Hippocrates, tyrant of Gela; on whose death, the people revolting against his sons, Gelon supported the latter, but finally set them aside and assumed the chief power himself (491 B. C.). Called to the assistance of the Gamori, the landed aristocracy of Syracuse, then expelled by the revolted slaves and the popular party, he contrived to become master of that city, appointed his brother Hiero governor of Gela, and by degrees extended his influence and power over all Sicily. He seems to have won the affections of the Syracusans by mildness, by the protection of arts and sciences, and by the aggrandizement of the city, for which purpose he even destroyed Camarina and other towns, and transplanted their inhabitants thither, as well as half the population of Gela. When Xerxes was threatening the invasion of Greece, the Lacedæmonians and Athenians invoked the assistance of Gelon. He promised a fleet of 200 vessels, 20,000 heavy armed and 6,000 light armed infantry, and 2,000 cavalry, upon condition of being elected chief and leader of the allied Grecian armies. To this the Lacedæmonian ambassador, according to Herodotus (vii. 159), replied: "If thou intendest assisting Hellas, go and be commanded by the Lacedæmonians; if thou disdainest to be commanded, stay away." He then sent an ambassador to Delphi, with rich gifts, and orders to greet and acknowledge Xerxes if victorious. Herodotus, however, also mentions a different version of the affair, which vindicates the character of Gelon and the policy of the Syracusans in not assisting Greece. They were fully occupied at home, for the Carthaginians at this juncture invaded Sicily with a great army. Gelon completely defeated them at Himera, on the same day, according to Herodotus, on which the Greeks won the victory of Salamis (Oct. 20, 480 B. C.), but according to Diodorus, on the day of the battle of Thermopylæ. He now proposed to resign his power, and restore popular liberty, but the offer was rejected in the assembly, and his exhibition of magnanimity was rewarded with the title of king, which he accepted and bore till his death. The Syracusans erected, against his will, a splendid tomb to his memory, and honored him as a hero. When Timoleon, 180 years afterward, sought to destroy all vestiges of the tyrants, the statue of Gelon was excepted. His brother Hiero was his successor.

GEM (Lat. *gemma*, a bud), the name of precious stones, prized for their brilliant lustre and splendid colors or perfect limpidity. They possess

also a hardness which renders them susceptible of the highest polish, and capable of retaining unimpaired the forms into which they are cut and the lines or figures that may be engraved upon them. These properties, in connection with their rarity, have given to them the highest value of all substances. The choicest among them have been prized above all other earthly possessions, consecrated by idolatrous nations to their gods, and by the civilized purchased at prices which the wealthiest governments alone could pay, to be held among their most valued treasures. These are commonly called crown jewels, and comprise diamonds, rubies, and emeralds, the largest of which may be hidden in the hand. The finest specimens of these are noticed under their respective titles; and reference may also be made to AGATE, CHRYSOBERYL, CHRYSOLITE, GARNET, SAPPHIRE, TOPAZ, TOURMALINE, &c., for accounts of other species of beautiful gems. These stones, which may be regarded as the richest flowers of the mineral kingdom, are not, like those of the vegetable world, usually presented by nature in their full beauty; but they are found in the form of worn pebbles among the sands derived from the disintegration of the rocks in which they were originally contained. Some, however, are obtained crystallized in the matrix of quartz, calcareous spar, or other gangue of veins in which they were produced, or in geodes, of the dark cavities of which they made with other crystals a lining or incrustation. The crystals may have the perfections of the stone fully developed, but art is not satisfied with the form, and this is almost always sacrificed to fit the stone to the conventional shapes judged best suited to display its highest lustre. The rough pebble, in whose dull exterior only a practised eye would recognize the gem, of course requires the work of the lapidary to develop its beauties. The processes to which the stones are subjected are described in the articles DIAMOND, and LAPIDARY; the method of carving them to bring out from their differently colored layers figures in relief is described under CAMEO; and GEM ENGRAVING will be treated in this article.—To distinguish gems from each other and from their artificial counterfeits, a practised eye has been generally sufficient; but the modern imitations, the manufacture of which is described at the close of this article, are so perfect, that the tests of comparative hardness and of specific gravity may often be required. The chemical tests which are usually employed to distinguish minerals cannot be applied to these stones on account of the injury they would occasion. The finest collection of gems in the world is that of the emperor of Russia. Siberia has proved a rich field for their production, and all precious stones found there belong to the crown. They are taken to Ekaterinburg, and being cut and polished in the government works, the choicest are selected for the imperial treasury. Clarke in his account of his travels in Russia makes frequent reference to the abundance

of fine gems met with in the cabinets and jewellers' shops, and states that in Moscow they were so much more highly prized than in western Europe, that the most costly gems were sometimes purchased in London to be deposited in Russian collections. Mr. Bayard Taylor made the following observations while at Moscow in 1858: "The shops of the jewellers are interesting, from the variety of precious stones, chiefly from the mountains of Siberia, which are to be found in them. The jewels most fashionable in Moscow at present are diamonds, emeralds, pearls, and turquoises. Opals also bring a large price, but stones of a secondary order, such as topaz, garnet, amethyst, onyx, and aquamarine, are plentiful and cheap. Siberia produces superb emeralds, and the finest amethysts, aquamarines, and topazes I ever saw. The Siberian diamond, which is found in abundance in the Ural mountains, appears to be neither more nor less than a white topaz. A necklace of 75 of these stones, the size of a cherry, costs a little less than \$20. I noticed a few fine sapphires, but suspect that they found their way hither from India, through Persia. One jeweller showed me a jacinth, a rather rare stone, with a splendid scarlet fire, for which he demanded 50 rubles. There were also some glorious opals, darting their lambent rays of pink, green, blue, and pearl-white, but their value was equal to their beauty. Malachite and lapis-lazuli, so common in Russian palaces and churches, are dear, and good specimens are not easy to be had." Different Asiatic countries, particularly Hindostan, Pegu, and Ceylon, have been famous from the remotest periods for their rich gems; and in modern times Brazil and Peru have almost rivalled them in these rare productions.—

**GEM ENGRAVING**, known also as the glyptic art (Gr. γλυπτός, to engrave), was skillfully practised in very remote times. In Exodus xxviii. 17–20, the following stones are designated as those upon which were engraved the names of the 12 children of Israel: sardius, topaz, carbuncle, emerald, sapphire, diamond, figure, agate, amethyst, beryl, onyx, and jasper. At this early period, as we learn from verse 11 of the same chapter, engraving of signets, and upon the hardest stones, was practised. The Israelites, it is believed, acquired the art from the Egyptians, who are known to have made use of the lapidary's wheel and emery powder, and are supposed to have been acquainted with the diamond and the method of engraving other hard stones by means of it. (Wilkinson's "Ancient Egyptians," vol. ii. p. 67.) Specimens of their work are still preserved in European collections, and also of that of the Etruscan artists of a somewhat later period. The Assyrians and Babylonians were very skilful in engraving on gems, great numbers of which have been found in the ruins of their cities. Many of their seals are most delicately and minutely ornamented with various sacred devices and with the forms of animals. The Greeks adopted the art, and practised it with the greatest zeal and suc-

cess. Their works of the time of Alexander the Great are still the most perfect specimens. The most distinguished among their earlier artists was Pyrgoteles, who alone was permitted to engrave the head of Alexander, as Apelles only was allowed to paint his portrait, and Lysippus to cast his image in bronze. In the time of the Roman emperors, Dioscorides from Æolia in Asia Minor attained the highest eminence. His head of Io is regarded by some as the finest engraved gem in existence, and others almost equally beautiful are two busts of Augustus, a head of Demosthenes on an amethyst, and various mythological representations. Several of the most skilful artists of Greece established themselves at Rome under the emperors. With the empire the art declined, and though the mechanical execution was not lost, no productions of genius appeared till the 15th century. At this time it became fashionable to make collections of antique gems, and among others Lorenzo de' Medici was especially interested in this object and in encouraging artists to imitate the finest productions, in which they attained great success. The same taste soon spread to France, Germany, and England; and in all civilized countries the art has since been held in high estimation. As applied to the hardest gems, as the diamond, ruby, sapphire, and topaz, it is no doubt carried to a higher degree of perfection than was attained in ancient times, for among the antique engraved gems preserved there are few if any of this class. Engraved gems are for the most part readily referred by connoisseurs to their true period, country, and sometimes to the artist himself. Each had his own cipher, which is commonly found upon the gem, though this is in modern times imitated, together with the peculiar style of the ancient artists and their complete work, in great perfection. Specimens of Egyptian art are recognized by the representations of the peculiar favorite animals and divinities of this people, accompanied with their hieroglyphics. Their gems were engraved almost exclusively in intaglio, and they were of the form designated as *scarabæi*, from the upper surface of the stone, always of the oval form, being cut to represent the beetle. The Etruscans also adopted this form, but their devices more resemble those of the earliest Greek workmanship. Their specimens are distinguished by low relief, a granular border surrounding the engraving, stiffness in the figures, peculiar style of letters and writing, wings given to the deities which the Greeks represent without wings, and names generally attached to the figures. The Greeks also practised chiefly in intaglio, and some of their finest works are in chalcidony and carnelian. The highly famed Dionysiac bull of Hyllus, an artist supposed to have lived before the age of Augustus, is upon chalcidony; and a celebrated specimen in carnelian is the beautiful seal of an unknown artist which once belonged to Michel Angelo, and was afterward preserved in the imperial library at Paris. The engraving represents a vintage, but the design



has been referred in various learned dissertations to a number of different objects, some of mythological character. Many impressions and copies have been taken of this famous specimen. The engraved gems of the first 15 centuries A. D., excepting the imitations of antique works, generally have designs from scriptural subjects—images of Christ and of the Virgin Mary, representations of the Good Shepherd, and often a fish, symbolical of the Saviour, from the letters in its Greek name, *ΙΧΘΥΣ*, being the initial letters in the appellation *Ιησους Χριστος Θεου Υιος Σωτηρ*. Some terms employed to designate certain styles of antique gems may be properly noticed here before speaking of the art in modern times. Stones convex on one side are said to be *en cabochon*; *chimæra* are those with representations of imaginary beings made up of portions taken from different animals; *grylli* are those with hideous heads, said to be so called from an Athenian named Gryllus, who was extraordinarily ugly; *conjugata*, or joined, are those with heads represented together upon the same profile—called opposite when they face each other. Engraving was practised both in intaglio and in rilievo, and the two styles were sometimes combined in the same specimen. Stones having differently colored layers, like the onyx, were especially adapted for the rilievo style, for an account of which see CAMBIO.—In modern times the finest gem engravers are found among the Italian artists of the 18th century and chiefly those of Florence. Some of their works are hardly inferior to those of the most famous Grecian artists. Flaviano Sirletti of Florence, who died in 1787, was especially distinguished for his copies of ancient gems and exact imitations of the ancient letters. The Costangis and many others also attained great repute; and in the present century are some whose productions, as those particularly of Signor Rega of Naples, rank with the famous antique gems. Among the Germans, Daniel Engelhard of Nuremberg, a friend of Albert Dürer, was celebrated for his skill in engraving crests and arms. He died in 1552. The works of the Pichlers, father and son, who came from Tyrol, are of the highest merit, especially those of the father. The son was much in Italy, and is often spoken of as an Italian. The celebrated Poniowski collection of antique gems has recently been credited to the elder Pichler. Natter of Swabia, who died in 1768, was not only a workman of the most delicate skill and refined taste, but a student and author also, and published in 1754 the only treatise specially devoted to his art: *Traité de la méthode de graver en pierres fines*. From this work it appears that the ancients employed the same sort of tools and the same methods as those in use at the present day. The modern practice is described by Holtzapffel in vol. iii. of his "Mechanical Manipulation." He speaks in high terms of the works of English artists, specimens of which, collected in Italy, have been credited to the artists of that country; and he names as especially distinguish-

ed, Wray, Burch, Marchant, and Charles and Henry Weigall; to which names may be added Pistrucci and the Wyons. The apparatus employed in engraving consists of a foot lathe attached to a small table, upon which is fixed a little pillar for holding the horizontal pulley, which is the receptacle for the cutting tool. This part of the apparatus is called the mill. The tools are soft iron wire spindles carefully annealed and nicely fitted to the hollow axis of the pulley. Only one is used at a time. When set in its place it projects through the bearings of the pulley, one end extending horizontally on the right hand side of the operator, who sits at his work in front of the table. This extremity of each tool is fashioned for its special work. Most of them terminate in a small disk, the edge of which, as it rotates rapidly, cuts lines in the stone held up against it, the tool being fed with diamond dust and oil. The larger sized disks are only about  $\frac{1}{4}$  inch in diameter, and from this they are made of decreasing sizes down to  $\frac{1}{16}$  of an inch, when the disk can scarcely be distinguished by the eye from the stem. They are also variously shaped for special kinds of cutting. The stone intended to be engraved is usually shaped by the lapidary, and is sometimes set by the jeweller before it is engraved. If not set, the engraver secures it to a wooden handle by the cement known as the lapidary's; or if set, he secures it in a notch in a piece of cork. The polish is removed by roughening the face with a suitable cutting powder, as the tools work better upon a rough surface, and the outline of the design, which is next marked with a brass point, is the more conspicuous. The area thus enclosed is then sunk by the tools to a suitable depth; and within this the details of the design are successively introduced and excavated. For the parallel lines called color lines, a thicker disk with two cutting edges is employed, its form being that of a little pulley; the two edges are just as far apart as the lines they are intended to cut, and as one pair is cut the stone is moved so as to bring the outer edge of the disk into the groove marked by the other edge, and thus the work goes on step by step over the surface to be thus "colored." The plan must be perfectly understood by the artist at the commencement of his work, and as it goes on he watches the effect produced with the aid of a magnifying glass conveniently attached to a stand over the tool, and occasionally takes a proof of his work in wax. After the stone is engraved the polish is restored to the flat surface by a pewter polishing disk or lap fed with rotten stone and water. The engraved portions are polished with great care, first by using in the mill copper tools charged with diamond powder; this buries itself more deeply in the copper than in the iron tools, and a smoother surface is thus obtained. Box wood tools charged with still finer diamond powder are next used, and after these copper tools charged with rotten stone and water. The harder gems, excepting

the diamond, which is engraved with the greatest difficulty, are better adapted for this process than those of softer quality. The latter are liable to hold the diamond powder and cause it to wear out the tools; they do not when finished present such smooth and highly polished surfaces as the harder stones. The amethyst is considered as soft a stone as can be cut very smoothly. Carnelian and bloodstone are of close texture, and admit of excellent work; the ruby cuts slowly, but small pieces are apt to flake off. The sapphire is firm and close; it cuts slowly, but presents beautifully smooth surfaces.—**ARTIFICIAL GEMS.** The great value attached to precious stones led at an early period to successful attempts to imitate them. The Egyptians possessed the art of coloring glass, and among their mixtures they produced excellent imitations of the most beautiful gems, so that, as Pliny states (xxxvii. 12), it was difficult to distinguish the false from the real. Their artificial emeralds, sapphires, and hyacinths are spoken of by various ancient authors. Some of the first named were of such gigantic size that they were used in the construction of statues, as of that of Serapis in the Egyptian labyrinth, 18½ feet in height. Another presented by the king of Babylon to an Egyptian Pharaoh was 6 feet long and 4½ broad; and an obelisk in the temple of Jupiter 60 feet high and 6 feet broad was composed of 4 artificial emeralds. (Wilkinson's "Ancient Egyptians," vol. ii. p. 68.) These were very extraordinary productions if made only of pieces of colored glass. Seneca also makes mention of one in his time who manufactured artificial emeralds. Beckmann states that in some ancient collections at Rome are pieces of colored glass, which were once used as jewels. In the Museum Victorianum are seen a chrysolite and emerald of faultless execution. In the 17th century the discovery of the preparation of gold and binoxide of tin, called purple of Cassius, afforded the means of giving a ruby red color to glass, and artificial rubies were then first made, especially by one John Kunkel, afterward Löwenstern, inspector in 1679 of the glass houses in Potsdam. In modern times the art has been wonderfully perfected by the French, chiefly through the genius of M. Donault Wieland. A glass called strass, of great lustre and perfectly transparent, of which the ingredients are given in the article GLASS, is prepared as the basis of the composition. It resembles the diamond in high refractive power as in its other qualities, except hardness. That it may be free from color its ingredients must be absolutely pure; and care must be exercised in selecting crucibles least likely to impart color to the fused mixture. The pure glass without addition of other matters may be cut into the forms adopted for the diamond and pass for this gem. Emerald is imitated by adding 8 parts of pure oxide of copper and 0.2 part of oxide of chromium to 1,000 parts of strass; sapphire, by adding 15 of pure oxide of cobalt to 1,000 of very white strass, the fu-

sion in a heated Hessian crucible to continue 30 hours. Topaz, to 1,000 of the same quality of strass, requires 40 of perfectly transparent yellowish orange-red glass of antimony and 1 of purple of Cassius; or, instead of these, 10 parts of oxide of iron. With the first the tint varies with the temperature and the time fusion has continued. Rubies are obtained by melting 25 parts of oxide of manganese with 1,000 of colorless strass; but the most perfect specimens are made by selecting the opaque mass often produced by the topaz mixture, which is transparent at the edges, and in thin plates red and transparent, and melting one part of this with 8 of strass. After being 30 hours in fusion it will give a fine yellowish glass; remelted with the blowpipe, the glass is like rubies of the finest water. Amethyst is made with 8 parts of oxide of manganese, 5 of oxide of cobalt, and 0.2 of purple of Cassius, to 1,000 of strass; the Syrian garnet, formerly called carbuncle, with 500 parts of glass of antimony, 4 of purple of Cassius, and 4 of oxide of manganese, to 1,000 of strass. In all these preparations success depends on a thorough pulverization and mixture of the ingredients; the use of the same sieve for sifting different mixtures should be scrupulously avoided; the fusion should be long continued at a graduated and uniform maximum temperature, and the mixture be annealed in cooling.—The researches and experiments of M. Ebelmen are of a higher order of art. He conceived the idea in 1847 of forming various mixtures with some ingredients volatile at very high heat. By the dispersion of these in the furnace the other ingredients should crystallize, as substances held in solution in liquids crystallize when these are evaporated. He thus proposed to produce the ruby, corundum or sapphire, and other precious stones. The volatile solvents or fluxes he employed were principally boracic acid and borax. The spinelle ruby, among the first minerals he imitated, was obtained by mixing together 80 parts of magnesia, 25 of alumina, 1 of chlorate of potash, and 35 of boracic acid, and subjecting 500 grammes (7,716 grains) of the compound to high temperature in the muffle of a furnace for 8 days. The crystals measured 0.197 inch on a side. Chrysoberyl was produced in crystals with faces of 0.24 inch, perfectly transparent, and scratching topaz, from a mixture of alumina 12 grammes, glucine 8.5, carbonate of lime 10, and fused boracic acid 14 grammes. The object of the lime was to form a fusible borate for holding the other ingredients in a condition favorable for crystallization. Chrysolite in well defined crystals resulted from silica 4.5, magnesia 6.15, and boracic acid 6. Transparent crystals of pure alumina, which are sapphire or corundum, and which presented the same hardness and specific gravity with this mineral, were a product of alumina thus fused with 8 or 4 parts of borax, or of 10 parts of alumina with 4 of silica and 16 of borax. M. Ebelmen employed also as fluxes the salt of phosphorus and the carbonates

of potash and of soda, all which are volatile at high temperatures, and by means of these solvents reproduced many other minerals, as he announced to the academy in 1851. His death shortly after terminated these interesting researches.—The great establishment of M. Bourguignon in Paris is the most famous manufactory of artificial gems in the world. About 100 workmen, beside many women and girls, are constantly employed in preparing and fusing the mixtures, cutting and polishing the stones, and lining the imitation pearls with fish scales and wax. The sand used to furnish the silica is from the forest of Fontainebleau; and its quality is so highly esteemed that much is exported for similar use elsewhere. The gems are such perfect imitations that they can be distinguished from genuine stones only by the closest scrutiny of those experienced in such matters. The great hardness of the natural stones it is found most difficult to imitate, and there is a want of permanency in the qualities of most of the imitations, which at last causes their true character to appear.—“A Popular Treatise on Gems,” by Dr. L. Feuchtwanger, was published in New York in 1859.

**GEMINI** (the twins), the 8d constellation in the zodiac, so named from its 2 brightest stars, to which the names Castor and Pollux are given, and which are about midway between Aldebaran and Regulus.

**GEMISTUS**, **ΓΕΜΙΣΤΗΣ**, surnamed **ΠΛΕΘΟ**, a scholar and philosopher of the 14th and 15th centuries, born in Constantinople, and said to have lived to the age of 100. He held a high position at the court of the emperor Manuel Palæologus, and at the council of Florence in 1439 opposed the union of the churches of the East and the West. Being subsequently banished from his country, he found an asylum in Italy, and declared himself in favor of the Latins. While the philosophy of Aristotle was still reigning, he became an enthusiastic votary of the Platonic theories in metaphysics and natural theology, and being admitted to the court of the Medici, prompted Cosmo, the head of that family, to found his celebrated Platonic academy. His treatise in praise of Platonism inaugurated the long quarrel between the disciples of the two great masters of antiquity, which produced a profound study of their systems. Gemistus, however, mingled with the Platonic philosophy the notions of the later Alexandrian school and of the spurious writings attributed to Zoroaster and Hermes, and revived in the West that eclecticism, half Christian and half pagan, half oriental and half Greek, which flourished during the decline of the Greek philosophy at Alexandria.

**GEMPAK**, **SOUGITA**, a Japanese physician, one of the first in his country that became acquainted with western learning, born about the middle of the 18th century. After studying at Miako and practising medicine in the Japanese manner, he learned that the Dutch, then the only Europeans trading in Japan, were more skilful in treating diseases, because they had a

better knowledge of anatomy, and rejected the Chinese superstitions and prejudices. He therefore after long labor mastered the Dutch language, translated into Japanese Kulm's treatise on anatomy (5 vols. large 8vo., including one of well executed plates, Miako, 1778), and acquired a knowledge of the European sciences and discoveries, which he imparted to his countrymen.

**GEMSBOK**. See **ANTELOPE**.

**GENEALOGY** (Gr. *γενος*, pl. *γενεα*, race, and *λογος*, discourse), an account or history of the origin, lineage, and relationships of a distinguished person or family. Such accounts are auxiliary to historical science, and interesting not only to persons who feel a more or less natural curiosity about their ancestors, but also to the historian as elucidating the often complicated relations of dynastic families, claims and controversies of succession, &c. They are also of importance in legal cases concerning claims to inheritance, and indispensable in states in which the enjoyment of certain rights is conditioned by qualifications of lineage or descent. The practical results of genealogical researches are given in lists or accounts of ancestors and their descendants, or in pedigrees or tabular views of the members of any particular family, and of their mutual relations. They are sometimes represented in the form of a tree (*arbor consanguinitatis*), giving a clear view of the various branches of the family and the degrees of descent from the common progenitor, who is generally represented in the root, sometimes in the stem. Genealogical tables are either descending or ascending. The former are chiefly used in historical records, presenting the descendants of a certain person in the order of procreation; the latter in documents of nobility, serving to show the claims of any man or family to the titles of paternal and maternal ancestors. Sometimes both forms are used together. Persons descended one from another successively form a direct line; those descended from a common progenitor, but not one from another, a collateral line. The members forming the first 7 degrees in a direct ascending line are called in Latin *pater* (father), *avus* (grandfather), *proavus* (great-grandfather), *abavus*, *atavus*, *tritavus*, *protritavus*; the corresponding 7 members in a descending line are called *filius* (son), *nepos* (grandson), *pronepos* (great-grandson), *abnepos*, *atnepos*, *trinepos*, *protrinepos*; those above or below the 7th degree are termed respectively *maiores* (ancestors) and *posteriores* (posterity). Thus the number of the degrees does not include the person from whom we begin. The same is the case in counting the degrees of a collateral line; two cousins, for instance, are said to be at the 4th degree from each other, there being 4 persons, the cousins and their parents, beside the common progenitor or head. The collateral line embraces the agnates, or the kindred on the father's side, and cognates, or the kindred on the mother's side.—The fabulous as well as historical records of the ancient nations contain numerous genealogi-

cal lists, which sometimes connect the families of man with demigods and gods. Various books of the Scriptures, and especially those of Genesis and Chronicles, prove that the Jews were most careful in preserving their genealogical records, which were carried back not only to Abraham, their national ancestor, but up to Noah and Adam as the common ancestors of all human race. They seem to have continued to guard their genealogical documents in private or public collections during the time of the 2d temple. This practice ceased with their dispersion after the conquest of Judaea by the Romans, and even the Cohenim and Levites (descendants of Aaron and of Levi), who are still distinguished from their non-Levite brethren by the exercise of special honorary religious functions, are known as such only by being acknowledged as descendants of parents who exercised the same. The inequalities of rank and right which prevailed during the middle ages made genealogical inquiries highly important, and it was then that researches of this kind assumed the form of a science, which became closely connected with heraldry. (See HERALDRY.) The work was generally done with little criticism, the chief object being to trace the origin of families in the remotest antiquity. Similarity of names led to connections with Roman or Greek heroes, including those of the Trojan war. A similar practice had been in use among the poetical genealogists of Rome. Ruxner's "Book of Tournaments" (Simmern, 1527) is full of examples of that extravagance so common in the numerous productions of the 15th century. Critical genealogical studies were not begun before the 17th. Duchesne, Hozier, Laboureur, and others in France, Dugdale in England, Rittershusius and Spener in Germany, completed the reform of the science. Their works were followed in the 18th and 19th centuries by those of Douglas, Betham, Gordon, Burke, Imhof, Gebhardt, Gatterer, Koch, Hübner, Lewis, Hormayr, Oertel, and others. The various genealogical almanacs published at Gotha since 1763 also contain valuable information.

GENESEE, a river of W. New York, rising in Potter co., Penn., near the boundary between the two states, flowing N. W. and N. E. for 145 m. through Alleghany, Wyoming, Livingston, and Monroe counties, N. Y., and falling into Lake Ontario, 7 m. N. of Rochester. It is not a navigable stream, but abounds in varied and romantic scenery, and has 5 falls in different parts of its course. The upper falls, 3 in number within a distance of 2 m., at Portage, in Livingston co., are respectively 60, 90, and 110 feet high, and for 3 or 4 miles the river flows between perpendicular rocks 400 feet high. Just above Rochester is a series of rapids, terminating in a fall of 100 feet, and 4 m. from the mouth of the river is another fall of the same height. From the head of the rapids there is a feeder to the Erie canal, which crosses the Genesee at Rochester by a freestone aqueduct, of 9 arches, each of 50 feet span. The Genesee

valley canal, which follows the course of the river for some distance, crosses the river at Genesee Falls, near Portage, by a similar work, and the Buffalo and New York city railroad has a bridge 800 feet long and 284 feet high near the same place.

GENESEE. I. A W. co. of N. Y., drained by Tonawanda creek; area, about 486 sq. m.; pop. in 1855, 31,532. It originally formed part of Ontario co., from which it was separated in 1802. It then comprised all that part of the state lying W. of the river of the same name. The surface is almost level, and the soil, consisting chiefly of a very sandy loam, is well suited both to grain and pasturage. Salt springs exist in several places, and iron, limestone, and water cement are obtained. It is a famous wheat growing district, and the Genesee flour has a high reputation. The productions in 1855 were 771,615 bushels of wheat, 437,052 of Indian corn, 299,809 of oats, 167,274 of potatoes, 41,398 tons of hay, 919,180 lbs. of butter, 105,873 of cheese, 80,056 of maple sugar, and 4,130 of tobacco. There were 46 saw mills, 22 grist mills, 1 brewery, 5 woollen factories, 2 carding establishments, 9 tanneries, 1 oil mill, 4 furnaces, 1 machine shop, 6 manufactories of agricultural implements, 61 churches, 143 school houses, and 5 newspaper offices. The Buffalo and Rochester and the Oanandaigua and Niagara Falls railroads, and a branch of the Erie railroad, traverse the county. Capital, Batavia. II. An E. co. of the southern peninsula of Mich., drained by Flint and Shiawassee rivers; area, 500 sq. m.; pop. in 1850, 12,081. Its surface is undulating, covered with extensive oak-openings in the S. part, and densely wooded with pine and other timber in the N. The staples are grain, hay, and lumber. The productions in 1850 were 134,021 bushels of wheat, 128,326 of Indian corn, 84,834 of oats, and 16,964 tons of hay. There were 7 corn and flour mills, 6 saw mills, 2 iron foundries, 1 woollen factory, 2 newspaper offices, 4 churches, and 3,876 pupils attending public schools. The unfinished railroad across the state, from St. Clair river to Lake Michigan, passes through this county. Capital, Flint. Organized in 1836.

GENESEE COLLEGE. See LIMA.

GENESEE FALLS, a township of Wyoming co., N. Y., on Genesee river, about 50 m. E. S. E. from Buffalo; pop. in 1855, 1,098. It is situated in the midst of some of the finest scenery on the river, and is much resorted to by summer tourists, for whose convenience there are several hotels. It is in the immediate neighborhood of the upper falls, and on the line of the Buffalo and New York city railroad and of the Genesee valley canal.

GENESIS, the name of the first book in the Bible, denoting, in Greek, "the generation," i. e., the account of the generation or production of all things. In the Hebrew it is called *Beresith*, signifying "in the beginning," because it commences with that word. Its history goes back to the very earliest ages of the human race,

and covers a period of at least 2,370 years; giving an account of the creation, the fall of man, the religion, arts, settlements, genealogies, corruption, and destruction of the ante-diluvian world; of the repopling and division of the earth, the dispersion of its inhabitants, the calling of Abraham, the rise and progress of the Jewish nation, &c. By most critics Moses is regarded as the author of the book of Genesis, though many suppose he derived a large part of his materials from written documents coeval, or nearly so, with the events recorded, being infallibly guided by inspiration in the entire work. This theory of the use of preëxisting documents by Moses is very ably discussed, as are all the important questions relating to the book, in Turner's "Companion to Genesis" (New York, 1841), and also in the "North American Review" (April, 1826), "Biblical Repository" (Oct. 1832), and "American Baptist Magazine" (1832). A few additions are supposed to have been made to Genesis after the death of Moses, probably by Ezra, who closed the canon of the Old Testament. The book of Genesis was distinctly recognized by Christ, and is cited in the New Testament literally 27 times, and substantially 38 times.

GENEST (in this country commonly written GENET), EDMOND CHARLES, a French diplomatist, born in Versailles about 1765, died in Schodac, Rensselaer co., N. Y., in July, 1834. Although his father was attached to the court and his sister was Mme. Campan, a lady in the service of Queen Marie Antoinette, he made himself known by his republican opinions. In April, 1789, he was appointed chargé d'affaires to the court of St. Petersburg, where his situation soon became uncomfortable; in 1791 he was notified by Count Ostermann, minister of Catharine II., that he had better not appear again at the court; and in July, 1792, he was formally dismissed. On his return to France, he was appointed ambassador to Holland; but before he had repaired to his post, he received (Dec. 1792) his nomination as minister to the United States. He arrived in April, 1793, at Charleston, S. C., where he was cordially welcomed. On May 20 he had a triumphant reception in Philadelphia; the citizens presented him with an address congratulating France upon obtaining the freedom she had helped the United States to secure. Encouraged by these demonstrations of popular feeling, Genest thought he could easily persuade the American people to embark in the cause of France, notwithstanding the proclamation of neutrality recently issued by President Washington. He openly maintained that the United States were in duty bound to side with France against England, and he bitterly denounced the American government for their want of sympathy toward the French republic. He even went so far as to fit out privateers from the port of Charleston, to cruise against the vessels of nations then at peace with the United States, and to project hostile expeditions against Florida and Louisiana, then colonies of Spain. In consequence of

these imprudent measures Washington demanded and obtained his recall; but Genest decided not to return to France, and accordingly settled in the state of New York, was naturalized, and married a daughter of De Witt Clinton. One of his grandsons was graduated at West Point and served in the U. S. army.

GENET (*genetta*, Cuv.), a digitigrade carnivorous mammal, of the family *viverrida*, inhabiting Africa, and occasionally found in southern Europe. The dentition and structural characters are the same as in the civet, the principal difference being that the anal pouch which contains the glands secreting the odorous substance is much less developed and prominent in the genet than in the civet. The common genet of Barbary (*viverra genetta*, Linn.; *G. vulgaris*, Cuv.) is of an ashy gray color, with blackish spots; the tail is nearly as long as the body, with long hair and 10 or 11 dark and light rings; the length of the body is about a foot and the tail about the same, and the height 5 inches. It is only semi-carnivorous, and will live in captivity wholly on vegetable food. The claws are sharp, semi-retractile, and well adapted for climbing; the anal secretion has a musky odor; as in other nocturnal animals, the pupil is vertical. The habits of the genet are like those of the weasel tribe; it is easily tamed, and is sometimes employed to catch rats and mice in houses; the period of gestation in captivity is about 4 months. The pale genet (*G. Senegalensis*, Fischer), or fossane, resembles the first species, and is of a reddish gray color, with pale spots above the eyes, brown bands and spots on the body and limbs, and an obscurely ringed tail. Both species prey upon small mammals, birds, and reptiles, and are not averse to fruits. Several other species are described.—The only representative of the family *viverrida* in America is the ring-tailed civet cat of Mexico and California; it is neither a civet nor a genet, though most resembling the latter, but the *bassaris astuta* (Licht.). It is about the size of a small domestic cat, but with a more slender and elongated body, pointed fox-like nose, projecting ears, large, prominent, and lustrous black eyes, and long annulated tail. The dentition differs from that of *viverra* in having the inner process of the upper carnivorous tooth more developed, with the anterior lobe of the lower shorter. The color above is brownish yellow, mixed with gray; and white beneath; tail whitish, with 6 or 8 blackish rings; the hair on the body is short and thick, but much longer on the tail; there are 5 toes on each foot, and the sharp claws are half retractile. In its erect ears, sharp nose, and cunning look, it resembles a little fox, whence the generic name; in its movable muzzle it approaches the civet and coati. It is found from the Red river in Arkansas and San Francisco through the temperate parts of Texas, California, and Mexico, where it is occasionally seen leaping about on the trees, as lively and graceful as a squirrel; rather shy in its habits, it usually stays in or

near its hole in a tree, generally some kind of oak, whence it makes short excursions in search of small animals, birds, insects, and various nuts. This animal is easily tamed, and is often kept as a pet by the Mexicans, Indians, and California miners. It brings forth in confinement 4 at a birth. It is a pretty, cleanly, and playful animal, and not unfrequently seen in menageries.

GENEVA, a post village of Seneca township, Ontario co., N. Y., beautifully situated at the N. W. extremity of Seneca lake, 200 m. W. from Albany; pop. in 1855, 5,057. It is on the Auburn and Canandaigua branch of the central railroad. The principal street runs parallel with the bank of the lake, at an elevation of 100 feet, and from many of the residences terraced gardens extend to the shore. It commands a fine view of the lake and of the surrounding country. Geneva is handsomely built, and contained in 1855 about 50 stores, 1 steam flouring mill, 1 saw mill, 2 furnaces, 1 bank, 8 printing offices issuing weekly newspapers, and 8 churches (Associate Reformed, Baptist, Dutch Reformed, Episcopal, Methodist, Presbyterian, Roman Catholic, and Universalist). The Episcopal church is a fine stone structure in Gothic style, and was built at an expense of \$25,000. Hobart Free college (called Geneva college till 1852) was established here in 1824, under the direction of the Episcopalians, and in 1858 had 5 professors, beside the president, 96 students, and a library of about 8,700 volumes. Geneva medical college, founded in 1894, has 6 professors and 16 pupils. Steamers ply daily on the lake between Geneva and Watkins, touching at intermediate places.

GENEVA (Fr. *Genève*; Ger. *Genf*; It. *Ginevra*), capital of the Swiss canton of the same name, celebrated for its religious, historical, and literary associations, and its picturesque scenery, situated on the confines of France and Savoy, on the high road from Paris to Italy, at the W. extremity of the lake of Geneva, where the Rhone issues from it in two rapid transparent streams which unite after passing the town; pop. of the canton in 1850, 64,146 (84,212 Protestants, 29,764 Catholics, and 170 Jews), and of the town and its suburbs 88,000. The railway from Geneva to Lyons (distance 168½ m.) was opened March 15, 1858, and a railway to Coppet, once the residence of Mme. de Staël, was commenced in July, 1858. The river Rhone divides the town into 3 parts, one of which is an island. The largest of the other 2 parts is situated on the left bank of the river upon a site about 90 feet above the level of the lake. The Quartier de St. Gervais on the right bank is chiefly inhabited by the working classes, and is the seat of industry and trade. The most elegant part of Geneva is the new Quartier des Bergues. Since 1850 most of the fortifications have been converted into promenades and quays. The prosperity of the town having been considerably increased by the industry of the population and the affluence of strangers and travellers, the general appearance of Geneva

has been much improved within the last 20 years, and further measures are contemplated for its enlargement and embellishment. The rapid passage of the Rhone beneath the 5 bridges which connect the different parts of the town gives great animation to Geneva. The environs are extremely grand and beautiful. The glaciers of Chamouni are within a short distance. Mont Blanc, in clear weather, is a principal feature in the landscape. Among the public buildings of Geneva are the *Hôtel de ville*; the Rath museum, named after the Russian general Rath, who was born in Geneva; the museum of natural history, containing De Saussure's geological collection, Haller's herbarium, Pictet's collection, the fossil plants of Brongniart and De Candolle, and Dr. Jurine's specimens of the fossils of St. Gothard; the public library, which contains many volumes of Calvin's MS. sermons and letters, letters of Beza, St. Vincent de Paul, and Rousseau. There are many institutions for the promotion of religion, science, literature, and art. An English church and a synagogue were opened in 1858, and a new Roman Catholic cathedral was erected in 1858. The principal church is that of St. Peter, which contains the monuments of Agrippa d'Aubigny and of Henri de Rohan, and in which Calvin preached. Geneva has celebrated private schools which attract many pupils from abroad, and commercial, industrial, artistic, and musical schools. The university of Geneva was founded in 1368, and reorganized in 1589 by Calvin and Beza. The college attached to it resembles the English Eton and Westminster school, and is conducted by 11 masters (*regentes*), under the direction of a rector, a principal, and the professors of the university. The studies at the university embrace belles-lettres, the different branches of philosophy and science, divinity, law, and medicine. Merle d'Aubigné, the historian of the reformation, is director of the theological school, which now numbers 40 students, 10 Genevan, and the rest mostly French. More than 1,000 youths are annually educated in the college and university; the annual salary of many of the professors hardly exceeds \$800. The excellent system of education which prevails in this institution, and its high religious and moral tone, cause it to be attended by many students from foreign countries, especially from France and Great Britain.—Geneva has long been celebrated for its manufacture of watches, jewelry, and musical boxes. The manufacture of watches dates from the 16th century, and at the end of the 18th century 6,000 persons of both sexes were employed in it. At present the number is diminished to about 8,000, though from improvements in the process of manufacturing and in the skill of the workmen, the annual production of gold and silver watches is much larger than formerly, amounting to over 50,000. There are also manufactures of velvet, silk goods, India stuffs, hats, leather, cutlery, firearms, chronometers, mathematical, musical, and surgical instruments. Geneva became a free port

in 1854; a *crédit mobilier* bank was established in 1856, and a central bank for mechanics' mutual aid societies in 1857. The transit trade is considerable, and the neighborhood of France and Sardinia gives rise to an active smuggling trade; the forwarding, commission, and banking business, especially the latter, is of great magnitude. Geneva is also the principal telegraph station and the focus of the railways of Switzerland, and the central point of the federal postal and customs union.—Calvin lived in Geneva, and Servetus was burned at the stake in the *champ de bûcher*, the ancient place of execution, outside the walls. John Knox was made a citizen of Geneva in 1558. Among the distinguished persons born in Geneva were Jean Jacques Rousseau, Necker, the naturalists De Saussure, Deluc, Bonnet, Huber, and De Candolle; Dumont, the friend of Mirabeau and of Jeremy Bentham; Sismondi the historian; and Gallatin the American statesman. Sir Humphry Davy died and was buried in Geneva. Guizot the French statesman, whose mother found an asylum in Geneva, received his early education there.—Geneva is supposed to have formed part of the territory of the Allobroges, and to have been subjected to the Romans about 123 B. C. The republic of Geneva originated in the municipal institutions of the town, to which Charlemagne granted certain privileges, subordinate, however, to the bishop, who was called prince of Geneva, and who was an immediate feudatory of the German empire. Dissensions occurred on many occasions between the citizens and the bishops on one side, and the counts of Genevois, who ruled the adjoining province of Savoy, and who claimed jurisdiction over Geneva, on the other. After the extinction of the line of the counts of Genevois, the dukes of Savoy were appointed their successors by the German emperor Sigismund (1422). Hence the claim of Savoy upon Geneva, from which the Genevans could only free themselves after several centuries by alliances with other Swiss states and by the aid of the reformation. The bishop of Geneva was expelled in 1534. Through the zeal of William Farel, the new service of the reformed religion was established in August, 1535. But the old parties, the partisans of Savoy, and the national party, most of whom were converts to the reformed religion, reappeared under new forms and fomented discord. Farel prevailed upon Calvin, who came to Geneva in Aug. 1536, to remain there. In a short time Calvin made himself the temporal as well as spiritual ruler of the town. Geneva became the leader of religion and the model of morals in Europe, the home of literature and learning, and the metropolis of Calvinism. An attack of Charles Emanuel of Savoy upon Geneva (Dec. 12, 1602) was gallantly repelled, and the victory then achieved is still commemorated. The independence of Geneva was solemnly recognized by the house of Savoy in 1754. In 1798 the town was occupied by French troops and incorporated with France as a part of the depart-

ment of Leman. After the overthrow of Napoleon it joined the renewed Swiss confederacy, (March 20, 1815), and several places which had formerly belonged to France and Savoy were added to its territory. A new and more liberal constitution was adopted, May 24, 1847, to remain in operation until 1862. Geneva was the first Swiss state to introduce trial by jury (1844), and exerted a liberal influence upon the national councils in the promulgation of the federal constitution in 1848. The canton sends 8 delegates to the federal council of the cantons, and furnishes to the Swiss confederacy a contingent of 2,199 men, 280 horses, 20 pieces of artillery, and about \$9,000 in money. The annual revenue and expenditures of the canton average respectively about \$300,000. The constitution guarantees religious freedom to the Roman Catholics. The Protestant churches are governed by a consistory, which is elected for 4 years, appoints an executive committee of 5, and is composed of 25 lay members and 6 clergymen. The *compagnie des pasteurs*, which comprises all clergymen and professors of theology, presides over the religious instruction of the Protestant population, and controls ecclesiastical appointments. The administration of education is in the hands of the government, but the parishes are called upon to contribute toward its support. The predominant language is French. The peasantry speak a *patois* which resembles somewhat that spoken in the neighboring districts of France, Savoy and the Pays de Vaud.

GENEVA, LAKE OF, OR LAKE LEMAN (Ger. *Genfer-See*; Fr. *Lac de Genève*; anc. *Lacus Lemanus*), one of the largest lakes of Europe, extending in the form of a crescent, with its horns towards the S., between Savoy on the S., and the Swiss cantons of Geneva, Vaud, and Valais. Its N. bank forms an arc about 53 m. in length, without reckoning the sinuosities; along its S. shore it measures 46 m.; and its breadth varies from 8 or 9 m. in the middle to 4 m. near the E. and 1 m. at the W. extremity; area, 82 sq. m. Its greatest depth is nearly 1,000 feet; its average depth is from 300 to 600 feet. Its elevation above the sea is 1,150 feet, but in summer, when the Alpine snows melt, it sometimes rises as much as 6 or 8 feet higher. At other periods it presents in particular parts of the lake, most commonly near Geneva, the curious phenomenon of a rapid rise and fall of from 2 to 5 feet in the course of 25 minutes. These changes of level, called *seiches*, have never been fully accounted for, but are supposed to be owing to the unequal pressure of the atmosphere upon different parts of the surface of the water. They are independent of the wind, and most frequent when the clouds are low and heavy. The lake is never frozen over, though ice forms in winter near its lower extremity. Its waters are pure and of a bright blue color, like those of the Mediterranean. The Rhone enters it at the E. end, a dark, muddy stream, and leaves it near Geneva perfectly pellucid and of the finest

sure one. The debris brought down by this stream are deposited around the upper end, and have made considerable encroachments upon its basin. Port Vallais, 1½ m. inland, was formerly situated on the shore, and the waters are said to have extended even as far as Bex, 12 m. up the Rhone. From Savoy Lake Geneva receives the Dranse, and from Switzerland the Venoge and the Vevayse. It has fewer fish than other Swiss lakes, but contains excellent trout, pike, carp, and perch, and a kind of salmon. Steamers ply daily between Geneva at the W. and Villeneuve at the E. end. The scenery, though lacking the dark grandeur of the bay of Uri in Lake Lucerne, and the sunny softness of some of the Italian waters, is an unfailing theme of admiration to travellers. On the N. are beautiful vine-covered hills, dotted with cheerful villages; opposite rise the abrupt cliffs of the Chablais, rearing their heads 5,000 feet above the lake. The majestic Alps are seen beyond them through the openings, and the shadow of Mont Blanc sometimes lies upon these waters. On the E., between the lofty summits of the Dent de Morcles and the Dent du Midi, about 9,000 feet high, a narrow pass opens into the Valais, while at the W. end the lake narrows almost to a point, and terminates among the pleasant slopes on which stand the city and suburbs of Geneva. The lake of Geneva is famous in literary history as the scene of the *Nouvelle Héloïse*, and for the abode in its vicinity of many celebrated authors, among whom may be mentioned Voltaire, Rousseau, Gibbon, Madame De Staël, Byron, and Shelley.

GENEVIEVE, SAINT. I. The patron saint of Paris, born in Nanterre in 419 or 422, died in Paris in 512. When St. Germain, bishop of Auxerre, preached in Nanterre, he was struck by her air of sanctity, and by his counsel she entered a convent. Living in Paris in 449, she is said to have predicted the invasion of Gaul by the barbarians of Asia; and when 2 years later Attila passed the Rhine and terrified Paris, she exhorted the citizens to courage and piety, assuring them that the city would not be attacked. The prophecy, justified by Attila's sudden departure, caused her to be regarded with reverence and affection by the Parisians. Such was her renown that Simeon Stylites at Antioch in Syria was accustomed to ask every one from Gaul that he saw for news of her. She passed her life in austerities, prayer, and pious works, and many miracles were attributed to her agency even after her death. A church dedicated to her was begun by Louis XV., but as it had not in 1791 been used for Catholic worship, it was adopted by the national assembly for the Pantheon. In 1852 this church was consecrated to St. Geneviève, whose festival is celebrated in it on Jan. 8. II. Duchess of Brabant, and countess palatine, lived early in the 8th century. She is the theme of many mediæval traditions, according to which she was falsely accused of adultery, lived 6 years alone in a wild forest, and was then dis-

covered by her husband, who was following the chase, and who was reconciled with her by finding the nuptial ring still worn on her finger.

GENGHIS (or ZINGIS) KHAN, an Asiatic conqueror, born about 1160, died in Aug. 1227. His father was the chief of a horde, consisting of numerous families or clans, and tributary to the khan of eastern Tartary. When born, the child had his hand full of blood; and pleased by the interpretation of this sign as a prediction of conquest and glory, the father procured for Genghis, or, as he was then called, Temudjin, an able teacher, who soon developed in him a talent for government and war. Temudjin was only in his 14th year when he succeeded his father, and after some reverses he made himself master of the neighboring tribes, 70 of whose chiefs are said to have been thrown into kettles of boiling water at his command. Against a league of more numerous tribes he was also victorious, but was unable to subdue them, and compelled to invoke the protection of Vang or Ung, the great khan of the Kerait Tartars. Temudjin supported him in his turn in different wars, and was rewarded with the daughter of the khan in marriage. But his bravery, liberality, and success soon made him an object of envy and fear; a war ensued, in which the khan lost his army on the battlefield, and his life while in flight. Another enemy of Temudjin, Tayan, khan of the Naiman Tartars, met with a similar fate in and after the battle of Altai, which gave Temudjin a great part of Mongolia and the capital Karakorum. In the next spring he held a great assembly of his nation at Blun-Yuldad, his capital, where the representatives of all the hordes appeared and proclaimed him their great khan. It was then that, obeying the words of a *shaman* (inspired man), who promised him the conquest of the earth, he adopted the title of Genghis (greatest), and gave to his people that of Mongols (the bold). He now organized their civil and military system, and laid down a code of laws which is still known in Asia under his name, and is based upon the belief in one God and the monarchy of one great khan, to be elected from the reigning family by the *kurultai*, or assembly of the nation. It grants great privileges to the nobles, allows polygamy, forbids to conclude peace except with the vanquished, and commands the delivery of arms into the hands of the government in times of peace, and when no national hunts are held. He granted equal rights to every religion, and admitted men of talents or merit to his court, whatever their creed. Appreciating the wisdom of other nations, he caused many celebrated books to be translated from foreign languages. But the ambition of the conqueror, surpassing the wisdom of the lawgiver, prompted him to new expeditions. The annexation of the Ugrian or central Tartars served to complete the conquest of Tartary; he now commenced that of China, passed the great wall, vanquished the opposing armies, devastated the country, and took, in 1215, Yeh-king (now Pe-king) by



assault. This great city was pillaged and consumed in a month by fire. Giving the command in the East to his son Tutahee, he now turned his sword to the West, crushed some revolted tribes and their allies, and took a bloody revenge for the murder of his ambassadors on Mohammed, sultan of Khovaresmia (now Khiva). An army of 400,000 men and the mighty cities of Bokhara, Samarkand, and others, opposed him in vain; the Mongols conquered and devastated the whole country; the cities were destroyed, and with them immense treasures of eastern science and art; and numberless inhabitants were slaughtered or carried away as slaves. Another Mongol army marched against Kaptshak, and took Derbend on the shore of the Caspian sea; another reduced Iran and Astrakhan, and, after a bloody battle on the Kalka, southern Russia; another continued the conquest of China and subdued Corea. The countries N. W. of India were also conquered, and an expedition against that country was begun. In this he is said to have shared the fate of Alexander the Great in a similar undertaking; after some victories the army refused to advance further, and he was compelled to return amid terrible difficulties. He now turned his arms against the kingdom of Tangut, passed the desert of Gobi in winter, and defeated 300,000 men on a frozen lake; the Tangut dynasty was extirpated. He was meditating a war against the Niudjes when death ended his career. He was buried in his native home, and his funeral was celebrated with songs, and, some historians say, with a hecatomb of beautiful young girls. His empire was divided among his 4 sons, Oglutai, chosen great khan, Djagatai, Tului, and Tutshee, whose armies soon completed the conquest of China, overthrew the caliph of Bagdad, made the sultan of Iconium tributary, and penetrated as far as the Oder and the Danube.

GENII, among the Romans, supernatural beings, corresponding to the demons (*dæmones*) of the Greeks, and analogous to the guardian angels of Christians. They were regarded as accompanying men from their birth through life as a kind of second or spiritual self; and every living thing and every place had its genius. Those of women were called Junones. It was customary for every one on his birthday to worship his genius as *sanctus et sanctissimus deus*, with libations and flowers. The collective Roman people had its genius, which was sometimes represented on coins.—The genii or djinns of the East are regarded as an intermediate class of beings between angels and men, but inferior in dignity to both, of pre-Adamite origin, created of fire, and capable of becoming invisible, or assuming the forms of men, brutes, or monsters, at pleasure. They eat and drink, are subject to passions and death, but may live for centuries. Their principal abode is in the Kaf chain of mountains, which is believed to encompass the earth, and to which they were compelled to retreat by an ancient Persian king who was a powerful necromancer. Djinnestan

is the common name of this ideal region. They also frequent baths, wells, ovens, ruined houses, seas and rivers, cross roads, and market-places. Their prince or chief is Eblis, so called from his despair, who was at first one of the angels nearest to God's presence, and was called Azazel, but was cast out of heaven for refusing, at the command of God, to pay homage to man at the time of the creation. His reply to the command was: "Thou hast created me of fire, and hast created him of earth." Some of them are believers in Islam, others infidels; some are good and some evil; and of both classes the Arabs stand in great awe. They pervade the earth, and rise to the firmament, where on the confines of the lowest heaven they listen to the conversation of angels respecting future things, and are thus enabled to assist diviners and magicians. Shooting stars are believed to be arrows shot by the angels against genii who transgress their limits. The peris, or fairies, are beautiful female genii, who believe in God and Mohammed his prophet, and seek to do good on the earth. The ghouls are a subordinate class of evil genii, haunting deserts and burial grounds, and killing and devouring men and women that fall in their way. The evil genii delight in mischief for its own sake, raise and direct whirlwinds, and dry up the springs of the desert. When the Zobaah, a whirlwind that raises the sand in the form of a pillar to a lofty height, sweeps over the desert, the Arabs, who believe it to be caused by the flight of evil genii, cry out: "Iron! iron!" of which metal the genii are believed to have great dread; unlike the Irish peasantry, who believed that whirlwinds of dust were raised by the fairies, and on such occasions used to raise their hats and say: "God speed you, gentlemen!" During the month of Ramadan the genii are believed to be confined in prison.

GENITIVE, in grammar, the second case in the declension of nouns and pronouns, generally indicating the relation expressed in English by the preposition *of*. It is distinguished as subjective or objective, the former denoting the source and the latter the object of the idea contained in the qualified noun; thus, respectively, "the deeds of heroes," and "the fear of God." There is also a partitive genitive, following and completing the meaning of adjectives and adjective pronouns, as "full of wine." The English possessive case, marked by the addition of the letter *s* preceded by an apostrophe, as "a bird's flight," is an instance of the genitive.

GENLIS, FÉLIX STÉPHANIE DUOREST DE, countess, a French authoress, born near Autun, Jan. 25, 1743, died in Paris, Dec. 31, 1830. She had a taste for music, acquired great proficiency on the harp, and was able to perform on the piano and 6 other instruments; but her education was almost entirely neglected, and she thought of nothing but amusement. When scarcely 15 years of age, she was married to Count Brulart de Genlis, a friend of her father who had fallen in love with her on seeing her portrait. Asham-

ed of her ignorance, she then devoted herself to study. By the influence of her aunt, Mme. de Montesson, who had been secretly married to the duke of Orleans, she was in 1770 appointed a lady in waiting in the household of the duchess de Chartres; became soon afterward governess of the daughter of that princess, and was formally nominated in 1783 by the duke "governor" of his three sons, the eldest of whom was afterward King Louis Philippe. Such a title given to a woman gave rise to no little scandal, and the influence she subsequently exercised upon the political course of her employer, the notorious Philippe Égalité, seemed to warrant the most injurious suspicions. During her governorship she published several works devoted to the moral education of her pupils—the *Théâtre d'éducation*, *Annales de la vertu*, *Adèle et Théodore*, *Les veillées du château*—which were generally well received by the public, and were highly praised by Gaillard, La Harpe, and other eminent critics. During the first years of the revolution she proclaimed her liberal opinions, and is said to have been the principal adviser of Philippe Égalité. She was obliged, however, to emigrate in 1792, and retired for a while to Switzerland, and then to Prussia. Amid all her troubles, she neglected no opportunity of mingling in worldly pleasures, and acquired a special notoriety at Berlin. During this period of her life she wrote and published several works, among which were her *Mères rivaless*, *Les petits émigrés* (new and revised edition, 1858), *Le petit La Bruyère*. In 1800 she returned to France, and was well received by the first consul; she was allowed handsome apartments at the arsenal and a pension of 6,000 francs, to which the wife of Joseph on his accession to the throne of Naples added an annuity of 8,000. In return for this, she had to write twice a month to Napoleon, and communicate to him her opinions and observations on politics and current events. She was convinced, and indeed declared, that these communications influenced the course of Napoleon in many important circumstances. This period of comparative repose and prosperity was also one of literary activity; she gave to the public, among other works, *Mlle. de Clermont*, the best of her performances, which ranks among standard novels in the French language, *La duchesse de La Vallière*, *Mme. de Maintenon*, and *Le siège de La Rochelle*. In 1814, although she had frequently, and with good reason, called Napoleon her benefactor, she went over to the Bourbons, but was coldly received. She met with little more encouragement from the Orleans family, who contented themselves with paying a small pension to their old "governor." Her temper meanwhile, which never had been very gentle, became sullen and unmanageable; her misanthropy increased with years; but her wrath was especially directed against the philosophers of the last century; she published amended editions, with critical notes, of several works of Rousseau and

Voltaire, and she even contemplated a similar "amendation" of the *Encyclopédie*, but, appalled at the magnitude of the undertaking, gave it up, and turned her pen against the most popular contemporary authors. Mme. de Staël, Byron, Sir Walter Scott, and Lamartine, were among the objects of her attacks. She was 60 years of age when she published her historical novel *Jeanne de France*, and over 80 when she completed her personal *Mémoires*, in 10 large 8vo. vols. In her latter years the once dashing fashionable lady had become a repulsive old woman, dressing in a slovenly manner and living in a gloomy apartment in one of the suburbs of Paris. Before her death, she witnessed the elevation to the throne of her pupil Louis Philippe; but estranged as she had been from him for long years, this was no joy to her. One of the most prolific writers in the French language, her admirers boasted that she had written as many volumes as Voltaire, if not more.

GENNESARETH, LAKE OF, called also the sea of Cinnereth, the sea of Galilee, the sea of Tiberias, and by the Arabs Bahr Tubariyeh, situated in Palestine, 90 m. N. of the Dead sea, and traversed by the river Jordan. It lies amid a circle of hills 620 feet above the level of the Mediterranean, occupies the bottom of a great basin of volcanic origin and of an oval form, and is about 18 m. long and 6 m. wide. There is little variety or beauty in its natural features, and the interest connected with it springs from its associations, especially from the fact that much of the public life of Christ was spent on its shores. Populous cities and villages then flourished around it, as Magdala, Capernaum, Chozazin, the two Bethsaidas, Gamala, and Hippos; and multitudes followed him as he taught along its beach or on the bordering heights. Four at least of the apostles were fishermen on this lake. The borders are now nearly desolate, and the fisheries neglected.

GENOA (Ital. *Genova*; Fr. *Gènes*; anc. *Genua*), an administrative division of the kingdom of Sardinia, bounded N. by Alessandria, E. by Parma and Modena, S. by the Mediterranean (gulf of Genoa), and W. by Savona; area, 1,250 sq. m.; pop. in 1857, 570,492. It is divided into the provinces of Genoa, Chiavari, Novi, and Levante. The duchy of Genoa, as constituted by the congress of Vienna, included the present division of Savona, and, stretching in a semicircle around the head of the gulf, was divided into the Riviera di Levante (eastern coast), and Riviera di Ponente (western coast). It is traversed by the Ligurian Apennines. The mountains rise to a height of about 5,000 feet, forming abrupt declivities toward the sea, and sloping down gradually toward the N., where the Scrivia, Trebbia, and other rivers flow to the Po. The streams flowing into the sea, the Magra and others, are insignificant. The sea forms numerous bays, among others those of Rapallo and Spezzia. The climate is mild and mostly healthy, but piercing N. winds and exceedingly hot S. winds are not unfrequent. The

summits of the mountains are bare; the valleys as well as occasional terraces on the slopes produce grains, wine, oranges, almonds, figs, chestnuts, &c. Salt, marble, asbestos, alabaster, and gypsum are produced. The inhabitants, mostly descendants of the ancient Ligurians, are a robust, well formed, active, and industrious people. Their common dialect is peculiar, and hardly intelligible to other Italians. Many of them are engaged in iron works, tanneries, paper mills, and cloth factories.—GENOA, the capital of the duchy, not undeservedly surnamed *la Superba*, is situated on the N. extremity of the gulf of the same name; lat. 44° 24' 20" N., long. 8° 55' 55" E.; pop. in 1857, 119,610. It is surrounded by a double wall, the smaller encircling the inner city, by ramparts and extensive outworks, detached forts, and redoubts, which make it one of the best fortified cities of Europe. Its large semicircular harbor is defended by two converging moles, the eastern or old, and the western or new. Near the former are the custom house and its environs (*dogana*), and the so called free harbor (*porto franco*); near the latter a lofty lighthouse and the quarantine; on the N. side of the harbor is the arsenal with a state dock and the bagnio. Viewed from the harbor, the city, rising like an amphitheatre, with its churches, palaces, promenades, and gardens, with its encircling fortifications, and with the bare summits of the Apennines and the ice-covered peaks of the Alps behind, offers one of the grandest and most picturesque sights in the world. The streets are mostly narrow, irregular, and steep; many are inaccessible to carriages. Some, however, are straight and handsome. But Genoa is principally famed for its palaces. They are rich in works of sculpture and painting, as are also the churches and chapels. Of these there are about 250, the most conspicuous of which are the Duomo or cathedral of San Lorenzo, the San Siro, Annunziata, Santa Maria di Carignano, San Matteo, Sant' Ambrogio, and San Stefano. Some are the works of private munificence, and some owe their foundation to the earliest times of the Genoese republic. The city is also adorned with various public places (*piazze*), with numerous historical monuments, including statues of Columbus, Andrea Doria, and other distinguished natives, with theatres, promenades, collections of art, and institutions of benevolence and learning, including a university, an academy of fine arts, a naval school, a school of medicine, an institution for the deaf and dumb, a botanical garden, rich libraries, and hospitals. It is the seat of an archbishop, a governor, and various high civil, military, and naval officers; it has a dock yard, an exchange, and several railroad depots, being connected by rail with Turin, Milan, and other places. Magnificent highroads lead over the mountains in every direction. Numerous steamers maintain communication with Marseilles, Leghorn, and other cities of the Mediterranean. Genoa is an important naval

station, and the chief commercial emporium of Sardinia; it also imports for Lombardy. Its exports consist chiefly of fruits and home manufactures, silk and velvet goods, ribbons and artificial flowers, wax, cloth, hats, soaps and perfumes, macaroni and preserves, and various articles of ivory, alabaster, coral, marble, and precious metals. The imports in 1855 were valued at \$48,000,000, and the exports at \$31,000,000.—The history of Genoa may be traced back in legendary traditions to a time preceding the foundation of Rome. Livy mentions it first, at the beginning of the 2d Punic war, as a town in friendly relations with the Romans. It was subdued and partly destroyed during that war by a Carthaginian fleet, which sailed from the Balearic isles under the command of Mago; the Romans rebuilt it, and it afterward became a Roman *municipium*. In the time of Strabo it was an emporium for the produce of the interior, exchanged by the Ligurians for the wine and oil of other parts of Italy. After the fall of the western empire it suffered greatly from the invading Goths, was taken by the Lombards in the 7th century, and conquered from them in the 8th by Charlemagne, who appointed a count for the government of the coast of Liguria. After the dismemberment of the Frankish empire, it became independent, and shared the fate of the Lombard cities, participating in their bloody struggles during the long contest for the iron crown of Lombardy, between the emperors of Germany, the Berengarii, and others. Having been pillaged in 935 by the Saracens, who at that time infested the shores of the Mediterranean, Genoa strengthened its navy, made an alliance with Pisa, and finally succeeded in expelling the Mohammedans from the islands of Corsica, Capraja, and Sardinia (1016-'21), of the two former of which it kept possession. An expedition to Africa, undertaken in 1088, was no less successful. Genoa was then governed by consuls, the first of whom are recorded in the latter part of the 11th century, and was already formidable at sea, preceding the Venetians in controlling the commerce of the Levant. But the maritime importance of the Genoese roused the jealousy of their commercial neighbors, and they had to struggle for the maintenance of their power in the western part of the Mediterranean against the rival republic of Pisa, and in its eastern part against Venice. The hostilities with the former commenced in the year 1070. The Genoese had a share in the glory and success of the first crusaders, their services being rewarded with a part of the coast of Palestine, including Acre. After the 2d war with Pisa (1118-'32), they undertook an expedition against the Moors of Spain, with a large fleet carrying a land force of 12,000 men, conquered the island of Minorca (1146), Almeria in the province of Granada (1147), where they found immense booty, and, in concert with the Catalonians, Tortosa (1148). Their power was also rapidly extended over the coast of the Mediterranean; before the close of the 12th cen-

tury they were masters of Monaco, Nice, Monterrat, Marseilles, and nearly the whole coast of Provence. The 8d war with Pisa commenced in 1162, and continued for nearly a century. The 4th, in 1382, opened with a great naval victory of the Genoese over the Pisans, who lost 3,000 killed and 13,000 prisoners, most of whom were doomed by the cruelty of the victors to perish in chains; it was concluded by the conquest of Elba, and the destruction of the harbor of Pisa, under Corrado Doria (1290). Thus peace was conquered, and the might of the rival republic destroyed. No less severe had been the struggle with Venice since the conquest of Constantinople by the Franks (1204), which was achieved under the lead and greatly to the profit of that republic. Having assisted Michael Palæologus to reconquer the capital of the Byzantine empire (1261), the Genoese were rewarded with the suburbs of Pera and Galata, and the port of Smyrna, which possessions made them the masters of the Black sea. After several naval battles a truce was concluded with Venice in 1271. On the termination of the wars with Pisa a mighty Genoese fleet crossed the Adriatic, and won a great victory near Curzola, where 84 Venetian galleys were taken or burned, and 7,000 captives made, among them the admiral Dandolo. This was followed by a treaty of peace (1299), which surrendered the commerce of the Black sea to the exclusive dominion of the Genoese, whose flourishing colonies and factories defended by forts soon lined all its coasts. Kaffa, or Feodosia, in the Crimea, conquered by them, became one of the finest commercial cities of Europe. Favored by the friendship and the indolence of the Byzantines, they carried on the commerce of the East, including India, through the Euxine and the Caspian seas. A new war with Venice broke out in 1346, in which the Genoese were victorious in a sea fight, in sight of Constantinople, but were beaten in another near the coast of Sardinia. To escape the consequence of this defeat and the perils of intestine commotions, they subjected themselves to the duke of Milan, Giovanni Visconti, whose yoke, however, they soon shook off. Having recommenced the war (1377), they took Chioggia, besieged Venice, and nearly reduced it, when two of its citizens, Vettor Pisani and Carlo Zeno, revived the spirit of the besieged, created a new fleet, blockaded Chioggia, and compelled the Genoese to surrender. The peace of Turin (1381) terminated the wars of the two greatest maritime republics of the middle ages; it was preserved, with slight interruptions, during the decline of both, caused particularly by the conquests of the Turks in the East, and the maritime discoveries in the West. Giustiniani and his companions strove heroically, but in vain, to save the great bulwark of Christendom, Constantinople, and the interests of Genoa (1453); and Mohammed II. revenged himself by stripping the republic of all its possessions in the East; even the com-

mercial access to the Euxine was soon closed by the Turks.—During all this growth and decline of the republic, its internal commotions, caused by the parties of the plebeians and patricians, and the subdivisions of the latter, had been a source of continual perils and distractions. Having been governed by consuls till 1190, then by *podestas* (annual magistrates, who were chosen from foreign cities) till 1270, it fell under the usurpation of Oberto Spinola and Oberto Doria, the "captains of liberty," who reconciled the lower classes, and maintained their power till 1291. A new change was the institution of the council of 12 members, subsequently of 24, 12 nobles and 12 plebeians. The feuds and even fights of the democratic and aristocratic parties, the Guelphs and Ghibellines, were meanwhile continuous. The latter faction, whose chiefs were the Dorias and Spinolas, was at last overcome and exiled by their opponents, headed by the Fieschi and Grimaldis, but afterward found means of returning. These party struggles assumed the worst shape in the first half of the 14th century. To remedy these evils the dogate for life was instituted (1389), with the exclusion of the nobles of both parties. But neither this nor the addition of councils was sufficient to give peace to the distracted state; new contentions arose with new families; there were doges and anti-doges; some were exiled, others forced upon the people. The Viscontis of Milan, and at a later period the kings of France, availed themselves of these dissensions to take possession of the republic. Francis I. held it during the first part of his wars with Charles V., but in 1528 the celebrated admiral Andrea Doria delivered the state from the French, and established a new constitution, which lasted to the end of the republic. The new form of government was strictly aristocratic; a roll of families both plebeian and patrician was formed, the nobility divided into the old and new; the former comprised the Grimaldis, Fieschi, Dorias, Spinolas, and 24 others distinguished by age, honors, or riches, and the latter 487 houses, to which new families could be added; the doge was elected for 2 years, and both branches of the nobility could aspire to this dignity. But the power of the state had long since departed; its conquests, colonies, and maritime stations were lost one after another; the last of them, Corsica, revolted in 1730, and was ceded to France in 1768; the commerce of the seas and of the East passed successively through the hands of the Portuguese, Spaniards, Dutch, and English; the flag of Genoa was insulted with impunity by the Mohammedan pirates of northern Africa, and its naval force was a mere shadow of the ancient fleets which awed all the shores of the Mediterranean and Black seas. The single bank of St. George (*compersa di San Giorgio*), which had been founded in 1407, still maintained its dignity and importance as an institution for loans and deposits, to which even foreign states, and particularly Spain, were greatly indebted. When in 1796 the French

had conquered the neighboring territories, Genoa strove in vain to sustain itself by neutrality. A rising of the democratic party was suppressed, after several days of bloodshed, by the nobles, who were assisted by the poorest of the population; but the French directory took the part of the democracy, and demanded a change in the constitution. This demand was supported by an army, and finally agreed to. The French garrison was taken into the city, and the state changed into the republic of Liguria, with a constitution like that of France, and some additional territory. In 1799 Genoa, under Masséna, sustained a siege by the Austrians and English, and was compelled to capitulate to the former, who were obliged, however, to give it up after the battle of Marengo (1800). The victorious Bonaparte, as first consul, gave it a new and less democratic constitution, which was soon abolished on the establishment of the French empire. After the coronation of Napoleon at Milan, the last of the doges, Durazzo, repaired to that city, and expressed the desire of the people for the change; and the decree of June 4, 1805, merged the republic in the empire, to form the 8 new departments of Genoa, Montenotte, and the Apennines. The bank of St. George, whose credit had greatly suffered by repeated loans to the state, was abolished, and the debts of the latter transferred to the account of France. In 1814 Genoa was occupied by the English, with whose permission the ancient constitution was reestablished. But the congress of Vienna (1815) annihilated the independence of Genoa, giving it as a duchy to Sardinia. In 1821 it joined for a moment the revolutionary movements of Italy. There was nothing remarkable in its history in 1848, but at the end of March, 1849, after the defeat of Charles Albert at Novara, and the conclusion of a truce with the Austrians, a revolutionary outbreak took place, the national guards occupied the forts, and the garrison was compelled to withdraw. A provisional government, under Avezzana, Morchio, and Reta, was formed, and the independence of the republic was proclaimed. But a large body of Sardinian troops, under Gen. Della Marmora, soon appeared before Genoa; a bloody struggle ensued, and the forts and principal points of the city were taken by the royal soldiery. In the meanwhile a deputation was sent to Turin, which returned with the amnesty of the king, excluding, however, the chief leaders of the movement, who had withdrawn on board the U. S. steamer Princeton. On April 10 Genoa was disarmed, and the monarchical government restored. During the Italian war of 1859, the city served as the landing place of the French troops arriving by sea.

GENOUE (originally GENOUD), ANTOINE EUGÈNE DE, a French journalist, born in Montélmart in Feb. 1792, died in Hyères, April 19, 1849. He began his career as a political writer by contributing to the royalist journal *Le conservateur*. In 1820 he founded the journal *Le défenseur*, and in 1821 he bought the *Étoile*,

which has since borne the name of *La gazette de France*. He abandoned his intention of entering the priesthood when, in 1822, he was ennobled by Louis XVIII. In 1835, however, after the death of his wife, he returned to his original plan, took orders, and began to preach in Paris. The archbishop of Paris soon ordered him to quit either preaching or journalism, and he chose the former alternative. In 1846 he was elected by the city of Toulouse member of the chamber of deputies, and in that body acted with the legitimist opposition. He differed, however, in many points from the legitimist party in general, defending universal suffrage, national representation, and legitimacy allied with popular sovereignty. In Feb. 1848, at the outbreak of the revolution, he spoke against the establishment of a regency, and allied himself with the revolutionary party in order to attempt a restoration of the Bourbons by means of a general vote of the people. When he saw that his efforts were fruitless he retired from public life. The bold advocacy of his principles in the *Gazette de France* involved him in 63 lawsuits, which cost him more than 100,000 francs. He wrote a *Histoire de France* (16 vols., Paris, 1844-'7), and published a French translation of the Bible, and of the "Imitation of Christ," an edition of the complete works of Malebranche (1837), and of the select works of Fénelon (1842), and of Bossuet (1845).

GENS D'ARMES, originally in France the whole body of armed men (*gens armata*), but from the 12th century applied particularly to armed men of noble rank, who are usually called in the documents of the time *militēs* in Latin, and *chevaliers* in French. The term assumed a more precise signification under Charles VII., designating the 100 men of rank who formed the *élite* of each *compagnie d'ordonnance*. The *gendarmes* acquired great celebrity under Charles VIII., Louis XII., and Francis I., especially in the wars of Italy. It declined in the 16th century, and the name had ceased to be much in use, when during the revolutionary period it was given to a corps composed of infantry and cavalry employed to protect the roads and streets and to enforce the orders of the police. The duties of rural police in France are performed by mounted gens d'armes, selected from the army. They are each paid \$400 per annum, out of which they provide a horse and a handsome uniform.

GENSERIO (from *Gaiseric*, prince of the spear), a Vandal conqueror, bastard brother and successor of Gonderic, died in 477. The Vandals had passed the Alps and the Pyrénées, and devastated and conquered the greatest part of Spain. In 429, when the weak and debauched Valentinian III. occupied the throne of the crumbling western empire, they were called to the province of Africa by Boniface, the governor, who had been induced by intrigues and the fear of a rival to betray his master. Eager for conquest, these northern barbarians prepared a fleet, and were ready to embark when the unexpected

attack of Hermanric, king of the Suevi, and the ravages of this people on the possessions of the Vandals, delayed their departure. Having routed the Suevi in a bloody battle, Genseric embarked his forces, and crossed the straits of Gibraltar. Alani and other barbarian tribes had swelled their numbers to 50,000, and Genseric tried to magnify their appearance by the appointment of 80 chiliarchs; the Moorish inhabitants of the Atlas mountains, so long oppressed by the Roman governors, and the Donatists, driven to despair by the persecutions of the orthodox church, joined them in Africa. Boniface too late repented of his crime; vanquished in battle, he retreated to Hippo Regius (now Bona in Algeria), but being unable to maintain himself he sailed to Italy. The whole of Africa west of Carthage was ceded by a treaty to the Vandals; but that city was also soon taken by surprise, and made the capital of the Vandal empire, which now extended over the whole coast, and by piratical expeditions was established in parts of Italy, Sardinia, and Corsica. The attacks of the Huns in the north of the Roman empire made these aggressions on its southern provinces easier, and it was Genseric who invited Attila to his fatal march to Gallia (451). Rome happily escaped the hands of the Huns, but its weakness and a series of crimes soon gave it into those of the Vandals. Invited, as is said, by Eudoxia, widow of Valentinian III, who wanted to avenge the murder of her husband by Maximus, Genseric crossed the Mediterranean, sailed up the Tiber, took Rome, pillaged it for 14 days, carried away Eudoxia and her daughters, one of whom he gave to his son Hunneric, and the Roman treasures and captives were sent to Carthage. Thus, after 600 years, a Vandal sword avenged the not less barbarous destruction of Carthage by Scipio. All the shores of the Mediterranean, from Asia Minor and Egypt to the straits of Gibraltar, were now infested by the ravages of the Vandals. A fleet, sent by the emperor Majorian (457) to check these ravages, was destroyed in the bay of Carthage; nor was another sent by the Byzantine emperor Leo (468) more successful; and Genseric reigned victoriously until his death. He was of middle stature, lame of one leg in consequence of a fall from a horse, slow and cautious in his speech, cunning, treacherous, cruel, ambitious, unscrupulous, an able general, and a skillful ruler. His share in the destruction of the Roman empire ranks him as a conqueror immediately after Alaric the Goth and Attila the Hun. He professed the Arian creed.

**GENTIAN**, in medicine, the root of the plant *gentiana lutea*, growing wild in the mountainous portions of Europe, and imported into the United States from Germany. Some other species of the genus are found in certain localities, and are also used for medicinal purposes. One of these, known as the blue gentian (*G. Catesbei*), is found in the grassy swamps of N. and S. Carolina, and so closely resembles in its proper-

ties the officinal gentian, that it is used at the South, and is introduced into the late catalogue of the U. S. pharmacopœia. Its flowers are blue; those of the foreign gentian are yellow, which is also the color of the powdered root. Both have at first a sweetish taste, followed by intense bitterness; and both yield their medicinal qualities to water and alcohol. The Swiss macerate the plant in cold water, and the sugar it contains causing it to ferment on standing, they distil from it a spirituous liquor, bitter and unpleasant, but much used by them. As a tonic it has been used from remote times, and the name is said to have been given to it from Gentius, a king of Illyria. It is found as an ingredient in many of the ancient receipts transmitted from the Greeks and Romans. It is still used in a great variety of complaints, its effect being to strengthen digestion, excite the circulation, and increase the warmth of the body; but it is liable to disagree with the stomach, exciting nausea and irritating the bowels, and cannot therefore be administered without due reference to the condition of these organs. It is given in powder, in extract, infusion, tincture, or sirup. The powder has been used as an external application to ulcers.

**GENTILES** (the equivalent of the Heb. גוים and Gr. ἔθνη), the name by which the Jews distinguished all the other nations or *gentes* of the world from themselves. In their use of it, it corresponds to our word heathen; for all who were not Jews, and circumcised, they regarded as gentiles or heathen, and as such excluded from all the religious privileges and relations by which they were so greatly exalted. In the writings of St. Paul the gentiles are generally denoted as Greeks. The court of the gentiles about the temple was the outer space, marked off by a wall or balustrade breast high, within which strangers were forbidden to enter, though they might come as far as the barrier to present their offerings. This explains the meaning of Paul, when he speaks of "the middle wall of partition" between Jews and gentiles as being broken down by the gospel.

**GENTILESCHI**, ORAZIO, whose family name was Lomi, an Italian painter, born in Pisa in 1568, died in London in 1647. At the invitation of Charles I. he took up his residence at the court of England, and was employed to decorate the palace at Greenwich and other public buildings. He was held in such estimation that Vandyke included him in his series of portraits of 100 illustrious men.

**GENTLEMAN**, an English title, having its equivalent in all the Romance languages, and applied, according to Selden, to one "that either from the blood of his ancestors, or the favour of his sovereign, or of those that have the virtue of sovereignty in them, or from his own virtue, employment, or otherwise, according to the customs of honour in his country, is ennobled, made gentle, or so raised to an eminence above the multitude, that by those laws and customs he be truly *nobilis*, or noble,

whether he have any title, or not, fixed besides on him." This definition would include noblemen, and all above yeomen. In another old English law book, a gentleman is defined to be "one who, without any title, bears a coat of arms, or whose ancestors have been freemen;" and according to another: "Whosoever studieth the laws of the realm, who studieth in the universities, who professeth the liberal sciences, and (to be short) who can live idly and without manual labor, and well bear the port, charge, and countenance of a gentleman, he shall be called master and taken for a gentleman." The title is now one of courtesy, and is given in England to any man above the rank of a common tradesman, whose manners and deportment indicate a degree of refinement and intelligence, and whose conduct is regulated by a true principle of honor. The title is so generally and vaguely used in the United States that no exact definition can be given of its meaning, which varies in different classes of society. The laws recognize no such distinction among men, though in legal documents, such as title deeds, a man who has no definite occupation is often styled a gentleman.

**GENTOO** (Port. *gentio*, gentile), a term used by old English writers to designate the natives of India. It is now obsolete, having been long superseded in popular use by Hindoo.

**GENTRY**, a N. W. co. of Mo., bordering on Iowa, intersected by Grand river, and drained by its E. and W. forks; area, 770 sq. m.; pop. in 1856, 8,781, of whom 69 were slaves. In 1850 it produced 180,528 bushels of Indian corn, 17,045 of wheat, 23,864 of oats, and 11,582 lbs. of wool. Named in honor of Col. Richard Gentry, who fell at the battle of Okeechobee, Florida, in 1837. Capital, Gentry Court House.

**GENTZ, FRIEDRICH VON**, a German diplomatist and publicist, born in Breslau in 1764, died June 9, 1832. He studied at Berlin and Königsberg, and was secretary to the directory of finances at Berlin when the French revolution broke out, of which he was from the beginning an ardent opponent. In 1792 he translated into German Burke's famous pamphlet on this subject, adding many violent notes to it. In 1802 he passed into the service of Austria, and after being sent to England to negotiate an alliance, drew up the Austrian manifesto of 1805. After the peace of Presburg he returned to Berlin, and after the disaster at Jena retired again to Vienna, where he composed the eloquent Austrian manifesto of 1809. He took part in the conferences of Vienna, and assisted in drawing up the treaty of the holy alliance. He wrote upon the morality of revolutions, the declaration of the rights of men, the principles of the French revolution, and the finances and national wealth of Great Britain. In literature he sympathized with the romantic school of Germany, and in politics defended absolutism.

**GENUS**, a closely allied group of animals or plants, characterized by ultimate structural

peculiarities. The higher relations of animals and plants, from branches to families, have been treated in the article **FAMILY**. Great confusion prevails among describers in the formation of genera, from their considering form and complication of structure as generic characters, whereas the former is characteristic of families, and the latter of orders; hence generic, family, and ordinal characters are mixed up in the determinations of almost all naturalists from Linnaeus to the present time, and genera have been unnecessarily and absurdly multiplied. Genera are subdivisions of families, and species are subdivisions of genera; the former, as has been stated, are limited by ultimate structural peculiarities, while the latter bear a closer relation to each other and to their special localities, their existence being also confined within a definite period. Generic peculiarities extend to the most minute details of structure of teeth, hair, scales, cerebral convolutions, distribution of vessels, arrangement of intestinal folds and appendages, and microscopic anatomy of the organs; so complete is this identity of structure that (in the words of Agassiz, "Essay on Classification," part i. chap. 1) if an animal were "submitted to the investigation of a skilful anatomist, after having been mutilated to such an extent that none of its specific characters could be recognized, yet not only its class, or its order, or its family, but even its genus, could be identified as precisely as if it were perfectly well preserved in all its parts." Every species of the genus *vulpes* (fox), for example, has the same dental formula, toes and claws, and other generic characters, whether arctic, tropic, or temperate, American, European, or Asiatic, in its habitat. Genera may or may not resemble each other in form; they usually have a wide geographical range, and, like the higher as well as lower relations among animals, are entirely unmodified in their characters by physical and external agencies. In the sauroid family of the ganoid fishes, for instance, we have the genera *lepidosteus* (gar pike) and *polypterus*; in the former, among the generic characters, are the narrow lengthened jaws, branchiostegous membrane with 3 rays, single dorsal fin near the tail, 1st ray of all the fins covered with imbricated serrated scales, caudal fin attached to the under side of the vertebral column, half gill on the gill cover, swimming bladder entirely cellular in 2 lateral halves communicating with the upper wall of the oesophagus, a slight spiral intestinal valve, and many pancreatic cæca; in the latter the head is oval and rounded anteriorly, 2 cirri above the mouth, 2 spiracles on the sides of the head, a very complicated nasal apparatus, branchiostegous membrane with a single flat ray, caudal fin rounded, numerous dorsal fins, no gill or gill cover, swimming bladder sacciform, not cellular, with fine internal longitudinal folds, and opening on the under side of the oesophagus, a well marked spiral valve, and a single pancreatic cæcum. The generic distinctions of the *testudinata*, or tor-

toises, both land and marine, founded principally on the characters of the skull, jaws, skin, and feet (see Agassiz, "Natural History of the United States," vol. i.), give an admirable idea of what constitutes a genus, as distinguished from families and orders.

**GEOCENTRIC** (Gr. *γη*, earth, and *κεντρον*, centre), having the earth as its centre or point of reference; a term used chiefly in astronomy.

**GEODE**, a hollow shell of stone, commonly of quartz, found in various rocks, and usually lined with crystals pointing toward the centre. These crystals are for the most part of quartz, often amethystine. Among the amygdaloids of the trap are found geodes of agate and chalcedony, the shell made up of concentric layers of these variously colored silicious matters. Beside quartz crystals, others of calcareous spar, analcime, &c., are found in the cavities of geodes. Some of the most remarkable specimens of this kind in the quartz geodes are found in low stages of water loose in the rapids of the upper Mississippi river. Externally they are rough and unsightly, of light brown color, and of all sizes up to 12 or 15 inches in diameter; when broken they present beautiful groups of quartz crystals. Water is sometimes found in the geodes holding the siliceous solution, and making with it a milky looking mixture. As the water evaporates the siliceous has been known to suddenly form into delicate crystals. Such geodes were at one time abundantly found on Briar creek in Scriven or Burke co., Ga., in a rock composed of hornstone and jasper; the milky fluid contained in them was used by the inhabitants as a paint or whitewash. ("American Journal of Science," vol. viii. p. 286.)

**GEODESY** (Gr. *γη*, earth, and *μετρον*, to divide), the science and art of laying out divisions of the earth's surface upon a large scale. It differs from ordinary surveying in its measurements being constantly referred to the spherical surface upon which they are made, and reduced to the same horizontal level. Corrections also are made for horizontal parallax in computing the value of instrumental observations, and the calculus of probabilities is applied to resolve their differences. Its object may even be the determination of the spherical curvature of portions of the surface, which is accomplished by the aid of extended series of astronomical observations made in connection with the most exact measurements. The methods of conducting these operations and contending with the numerous causes of error, incident to the imperfection and comparative insignificance of the instruments and powers employed, are treated in the article on the U. S. COAST SURVEY, which is the most perfect as it is the latest example of large geodetical operations.

**GEOFFREY OF MONMOUTH**, an old English chronicler, born probably in Monmouth about 1100, died about 1154. He is supposed to have received his education in the Benedictine monastery near Monmouth, where he compiled his *Chronicon sive Historia Brittonum*, to which

he probably owed his promotion in 1152 to the see of St. Asaph. Geoffrey's chronicle professes to be a translation from an old Welsh manuscript which one Walter Calenius, an archdeacon of Oxford, discovered in Brittany, and which he requested him to render into Latin. That some part of the work is a translation there seems to be no doubt, as its main features agree with the history of Nennius, written 3 centuries previous; but so numerous are the legends and fables interwoven into it, and so extensive is the period it embraces—from Brut the great-grandson of Æneas to the death of Cadwallader or Ceadwalla, king of Wessex, in 688—that its historical value is very inconsiderable. If historians are inclined to doubt the veracity of Geoffrey, the readers of romance are indebted to him for having preserved and perhaps reconstructed the delightful legends of Arthur and his knights, the romantic fairy pageantry of which can be traced through so many centuries of English poetry. The work was originally divided into 8 books, to which Geoffrey added the book of Merlin's "Prophecies." The best recent editions are those of J. A. Giles (1842), and Bohn (1848), both of which are reprints from a translation by Aaron Thompson originally published in 1718.

**GEOFFROY, JULIEN LOUIS**, a French critic, born in Rennes in 1748, died in Paris, Jan. 26, 1814. A pupil of the Jesuits, he was first a tutor in the Montaigu college, then in a private family, and commenced his literary career with a tragedy never performed nor printed. In 1776 he was appointed professor of rhetoric in the college of Navarre at Paris, and soon left it to occupy the same chair in the Mazarin college. About the same time he became a contributor to the *Année littéraire*, a review founded in 1754 by Fréron, and he continued to write for it for 15 years. From 1781 he also published another literary periodical called *Journal de Monsieur*; and in 1790 he undertook, in conjunction with Montjoie and the brothers Royou, the publication of an ultra-monarchical daily paper, *L'ami du roi*, which was discontinued Aug. 10, 1792. In order to avoid the dangers incurred from his monarchical opinions, Geoffroy left Paris, and became a schoolmaster in some obscure village. He returned to the metropolis after the 18th Brumaire (1799), attempted to resuscitate the *Année littéraire*, and became attached to the *Journal des débats* as literary critic. Theatricals were his especial province; and his *feuilletons*, in which he displayed great scholarship and bitter sarcasm, enjoyed unparalleled success. His articles were collected and published in 1819-'20 under the title of *Cours de littérature dramatique*.

**GEOFFROY SAINT HILAIRE, ÉTIENNE**, a French zoologist, born in Étampes, April 15, 1772, died in Paris, June 19, 1844. He was first educated for an ecclesiastical life, but early evinced a taste for natural philosophy, and was encouraged by Haty and Daubenton to follow his inclination. He had already gained



some proficiency as a mineralogist when the revolution broke out. Having been incarcerated as a recusant priest, his pupil managed to procure his liberation, and at the peril of his life he rescued 12 other priests from prison, on the very eve of the massacre of Sept. 1793. A few months later he was appointed to a subordinate office in the *jardin des plantes*, and in 1798, on the reorganization of this establishment under the name of "Museum of Natural History," he was promoted to the professorship of zoology, and of course intrusted with the keeping of the collections. To this twofold task he devoted himself entirely; but while he succeeded as a lecturer, he accomplished wonders in his other functions. Through his unflinching zeal and exertions, the old specimens were put in order, new ones were procured from every part of the world, and finally the zoological collections, under his supervision, became the richest in the world. In 1795 he welcomed to Paris, and treated as a brother, George Cuvier, then entirely unknown to fame; both in concert pursued researches in comparative anatomy, and at that time each of them had but a faint conception of the opposite systems upon which they were to separate some 35 years later. In 1798 Geoffroy consented to be one of the scientific commission that accompanied Bonaparte to Egypt; remaining there until the surrender of Alexandria in 1801, he was one of the founders and most active members of the Egyptian institute, thoroughly explored the country, gathered valuable collections of natural specimens, and succeeded in bringing them to France; he threatened to burn them all rather than deliver them into the hands of the English, as the terms of capitulation required. The papers in which he described these specimens attracted general attention, and resulted in his election to the academy of sciences in 1807. The next year he went on a scientific mission to Portugal, and on his return he was appointed to the professorship of zoology in the faculty of science at Paris, which post he filled for years simultaneously with that at the museum. From 1812 to 1815 his scientific occupations were partly interrupted by sickness and political activity. He was a member of the chamber of deputies during the Hundred Days; but on the second restoration he returned to his wonted pursuits, and then commenced the unfolding of his philosophical system. He applied himself to demonstrating the principle of which Buffon and Goethe had had but a glimpse, the unity of organic composition among the various kinds of animals; and he founded what he called the "theory of analogues." The unity of composition, according to his idea, is the law of identity in the materials composing the organs of animals of different families, and which, although infinitely varying in shape, bulk, and use, are still the same in all, and discover a single plan; while the theory of analogues is the method through which the unity of composition is demonstrated. As to

the unequal sizes among the various creatures, and monstrosities in individuals, they are explained by the principle of arrest of development. These principles, at once bold and original, were in direct contradiction to those which Cuvier had adopted as the basis of his comparative anatomy; and this opposition, which had been silently going on for years, at last broke out openly, July, 1830, in the sittings of the academy of sciences. The contest between two illustrious champions, well armed with all the resources which science, experience, and talent could afford, caused a deep sensation throughout the scientific world of Europe; and in the estimation of Goethe, it was far more important to humanity than the political revolution that was going on at the same time. Notwithstanding the superiority of Cuvier as an orator and scientific expounder, the victory was left undecided, and many among the learned sided with Geoffroy, whom the great German poet hailed as an apostle of the true synthetic doctrine. Whatever may have been his faults, he is incontrovertibly, after his opponent and friend Cuvier, one of the most important contributors to the advancement of the science and philosophy of natural history. His views contain much of the transcendental element of the German physio-philosophers, and, if carried to their legitimate conclusions, lead to doctrines directly opposed to the prevalent philosophy of final causes; his ideas will be further elaborated in the article PHILOSOPHICAL ANATOMY. Among his numerous works and papers, which embrace nearly all branches of zoology, we refer specially to the following: *Philosophie anatomique* (3 vols. 8vo., 1818-'22), which contains the exposition of his doctrine; *Principes de la philosophie zoologique* (8vo., 1830), which gives a synopsis of his discussions with Cuvier; *Études progressives d'un naturaliste* (4to., 1835); *Notions de philosophie naturelle* (8vo., 1838); *Fragments biographiques* (8vo., 1838); *Histoire naturelle des mammifères*, in conjunction with Frédéric Cuvier (fol., 1820-'42). He also contributed to several great publications, and especially to the description of Egypt by the scientific commission of which he was a member. It was not till 1840 that he gave up active life on account of blindness; a few months later he had a stroke of paralysis; but he withstood his last sufferings with admirable equanimity. His eulogy was delivered by M. Flourens in 1852 at the academy of sciences; an excellent biography had been previously published by his son under the title *Vie, travaux et doctrine scientifique d'E. Geoffroy Saint-Hilaire* (Paris, 1848).—LARDER, a French zoologist, son of the preceding, born in Paris, Dec. 16, 1805. Under the direction of his father he early devoted himself to natural philosophy, became assistant naturalist at the museum when only 19 years old, and in 1830 delivered zoological lectures in that institution as his father's substitute. Three years later he was elected to the academy of sciences. He was then

publishing a great work in which he enlarged upon a branch of the natural system outlined by his father; this was his *Histoire générale et particulière des anomalies de l'organisation des l'homme et les animaux, ou traité de tératologie* (3 vols. 8vo., with an atlas, 1832-7). On its completion he was appointed assistant lecturer to his father at the faculty of sciences, afterward filled some important offices in the university, and finally in 1850 resigned the post of general inspector to resume the chair of zoology, to which he was then formally appointed. He has since devoted his leisure to publishing his *Histoire naturelle générale des règnes organiques*, which was commenced in 1852, and is still in progress, and is to be completed in 5 vols. 4to. He has also paid much attention to the domestication of foreign animals in France, as appears from his treatise, *Domestication et naturalisation des animaux utiles* (Paris, 1854), and has advocated the use of horse flesh as food in his *Lettres sur les substances alimentaires, et particulièrement sur la viande de cheval* (Paris, 1856).

**GEOGNOSY** (Gr. *γη*, the earth, and *γνῶσις*, knowledge), the science of the structure of the earth; a term introduced by Werner, for which the synonymous term geology has since been substituted. Dr. Whewell suggests that in adopting the name geognosy, the knowledge of the earth, instead of geology, the Wernerians appear to have intended to select descriptive geology for their peculiar field.

**GEOGRAPHY** (Gr. *γη*, the earth, and *γραφειν*, to write), the description of the earth. The science of geography comprises 3 principal divisions: mathematical geography, physical geography, and political geography. Mathematical geography treats of the figure, magnitude, and motion of the earth, of the construction of globes, and the solution of problems; of the mode of determining the position of places on the earth's surface, and of representing any portion of that surface on maps or charts. Most of these topics belong as much to astronomy as to geography. (See **ASTRONOMY**, and **EARTH**.) Physical geography treats of the earth and its features of land, water, and air, its animal and vegetable inhabitants, without reference to national or political divisions. (See **PHYSICAL GEOGRAPHY**.) Political geography describes the countries and nations of the earth as they are politically divided, and deals with mankind in their social aspect and organization. The details of this branch of the science will be found under the names of the various countries, cities, and towns of the globe.—Among the ancients, the Phœnicians were the first who made any great progress in extending the bounds of geographical knowledge. They seem to have explored all the coast of the Mediterranean, and at an early period to have passed the strait of Gibraltar, and visited to some extent the Atlantic shores of Europe and Africa, extending their voyages northward as far as Britain and southward to the tropic of Capricorn. Their neighbors, the Hebrews, probably acquired from them some knowledge of distant lands. In

the Scriptures the remotest regions mentioned are, to the N., Gomer (Gen. x.), by which was probably meant the Kimmeri of Herodotus, and Kir, the Caucasian region of the Kur; to the E., India (Esther i. 1), and very probably China, called the distant "land of Sinim" (Isaiah xlix. 12); to the S., Cuah (Ethiopia), Ludim or Lubim (Libya), Dedan, Sheba, and Ophir, concerning whose situation many conjectures have been made, the most probable of which seems to be that it was a place in southern Asia. To the W., the extreme land was Tarahish, which was probably Tartessus in Spain, though some critics suppose it to have been Carthage. The first attempt to enlarge the bounds of geographical knowledge by an exploring expedition was made by Necho, king of Egypt, about 604 B. C. He sent down the Red sea into the Indian ocean a fleet manned by Phœnicians, which in the third year, after circumnavigating Africa, reached the pillars of Hercules or strait of Gibraltar, and returned to Egypt by the Mediterranean. Herodotus, who relates this extraordinary voyage, expresses his disbelief of the circumstance which to modern science affords the strongest proof that it really took place. The Phœnicians on their return asserted that during a part of the voyage the sun was in the north. This statement, which shows conclusively that they must have sailed to the south of the equator, Herodotus, naturally enough, wholly discredited. The geographical knowledge of the ancients was greatly enlarged by the Carthaginians, whose extended commerce led necessarily to long voyages, but the only authentic account of any of their maritime expeditions which has reached us is that of Hanno, the time of which is uncertain, but is plausibly conjectured to have been in the 5th century B. C. With a fleet of 90 vessels he passed the strait of Gibraltar, and sailed down the coast of Africa, as some writers suppose, to the gulf of Benin, while according to others he proceeded no further than the river Nun. About 320 B. C., Pytheas, a seaman of Massilia, the modern Marseilles, sailed out into the Atlantic, coasted the shores of Spain and Gaul, visited Britain, and passing onward, discovered an island, which from that time was famous among the ancients as *Ultima Thule*. It has been conjectured that this was Iceland, but nothing certain is known about it. The Indian expedition of Alexander the Great, 320 B. C., greatly enlarged the ancient knowledge of India. He penetrated to the Hyphasis, the modern Sutlej, the most eastern and most important of the 5 rivers which flow through the Punjab. The ambassadors of Seleucus, one of his successors, reached the Ganges and visited the city of Palimbothra, which was probably on the site of the modern Allahabad. Beyond this the Greeks seem to have known little or nothing of eastern Asia. The first systematic attempt at scientific geography was made by Eratosthenes, who lived between 276 and 196 B. C., and was an eminent scholar at Alexandria in the reign of Ptolemy III. The globular form

of the earth was at this time known to the scientific schools of Alexandria, and the system of Eratosthenes was based upon its recognition, though he disregarded the great primal features of modern geographical science, the equator, the poles, and the tropics. The base line of his geography was a parallel drawn from W. to E. through all the places where it was supposed that the longest day was 14½ hours. It stretched from Cape St. Vincent in Spain eastward through Rhodes, Asia Minor, Persia, and India, till it terminated at the city of Thinae, which was supposed to be on the shores of the eastern ocean at the utmost extremity of the earth. The distance from one extremity of this line to the other, according to Eratosthenes, was about 70,000 stadia, or 9,000 miles. At right angles to this parallel Eratosthenes traced a meridian which passed through Rhodes and Alexandria southward through Syene and Meroë, till it reached what was supposed to be the uninhabitable region, the northern bounds of which were fixed at 12 degrees from the equator. Thule was regarded by Eratosthenes as the extreme northern end of the earth, and the distance from there to the habitable limit toward the equator was computed at 88,000 stadia, or nearly 5,000 miles. Beyond these limits of 9,000 miles in length and 5,000 miles in breadth it was commonly supposed that nothing existed but an impassable ocean, though Eratosthenes cautiously conjectures that there might exist in it continents and islands which could be reached by sailing westward. Hipparchus, a Bithynian who lived at Rhodes (160-145 B. C.), carried still further the system adopted by Eratosthenes, and subjected the whole science of geography to astronomical principles. He made numerous observations of latitude in addition to the few previously existing, and pointed out the mode in which longitudes might be ascertained by observing the eclipses of the sun and moon. But Hipparchus was greatly in advance of his age, and his discoveries were neither appreciated nor applied to any practical use till long after his time. Somewhat more than a century after Hipparchus, Strabo, a Greek of Pontus and a great traveler, wrote a geography which embodies all that was known of the science at the beginning of the Christian era. The countries immediately around the Mediterranean were known with tolerable accuracy; but the Atlantic shores of Europe were very erroneously comprehended, while of the northern and eastern portions only the vaguest ideas were entertained. Nothing whatever was positively known of Scandinavia, Russia, or of northern Germany. The extent of Europe to the E. and N. E. was greatly exaggerated, while that of Asia was proportionally underrated. Nothing was known of Siberia, Tartary, China, Japan, or the great Asiatic archipelago. The Ganges was thought to have throughout an easterly course, and to flow into the eastern ocean. The Caspian was supposed to be the limit of the earth to the N., and to be

connected with the eastern ocean by a sea occupying the space now known to be covered by Siberia and Tartary. Of Africa only the northern part was known, S. of which was thought to be an uninhabited and uninhabitable torrid zone. The belief in the probability of circumnavigating Africa, which had existed in previous ages, was rejected by Strabo, though he held to the theory of an encircling ocean. A still more famous geographer than Strabo was Ptolemy, who lived at Alexandria about the middle of the 2d century after Christ. At this period the Roman empire had reached its greatest extent, and all its provinces had been surveyed and were well known. Large advances had been made in the knowledge of the countries outside of the empire. The notion of a circumambient ocean had been given up, and an indefinite expanse of *terra incognita* substituted as the supposed boundary of the world. Africa, however, was represented as stretching indefinitely S., and it was even carried round to join the E. of Asia, so that the Indian ocean was enclosed like the Mediterranean. In Europe, Spain and Gaul were for the first time correctly delineated, together with the southern part of Britain. The outline of Scotland and the relative position of Ireland are very incorrectly given. Thule is laid down as an island upward of 100 m. in length. From its position it is probable that some part of Norway was meant. Northern Germany and the southern line of the Baltic coast were tolerably well known, as was also some portion of Russia in the neighborhood of the Baltic and the southern part of Russia in Europe. In Asia, great regions had become known sufficiently to make it certain that they were inhabited by nomade tribes called Scythians, while from the far east some vague report of China and of the regions now known as Chin-India had reached the geographer. From the time of Ptolemy till the revival of letters in Europe little progress was made in geographical knowledge. In the 18th century missions were sent by the popes into remote parts of Asia. Father John de Plano Carpini, with some Franciscan monks, was sent in 1246 by Innocent IV. to Kayuk Khan, the Tartar emperor, and penetrated as far as Thibet. In 1268 Rubruquis, another Franciscan, was sent by Louis IX. of France in search of Prester John, and penetrated further into Asia than any European had ever before done. But the greatest discoveries in this quarter were made by the celebrated Marco Polo, a Venetian noble, who in 1266 set out with his father and uncle on a journey to the court of Kublai Khan, the Tartar conqueror of China. After travelling for more than 8 years they reached Yeh-king, near where Pe-king now stands. Marco Polo resided 17 years in the East, and on his return gave an account of his travels, which first made known to Europe the existence of Japan and of many of the East Indian islands and countries. In the 15th century the spirit of enterprise and of geographical exploration was strongly aroused in Europe. Portugal

took the lead, and made great and systematic efforts to explore the unknown countries on the W. coast of Africa. In the year 1412 Cape Non was doubled, and soon afterward the islands of Porto Santo and Madeira were discovered. In 1484 Benin and Congo were discovered, and the coast explored for 1,500 miles S. of the equator. Finally in 1486 the cape of Good Hope was reached, and 11 years later doubled by Vasco da Gama. But the greatest of all geographical discoveries was that of the new world by Christopher Columbus in 1492. From this time forward the progress of geographical exploration was exceedingly rapid. Within 80 years from the date of the first voyage of Columbus the whole E. coast of America from Greenland to Cape Horn had been explored, and Spanish keels were floating on the Pacific ocean. In 1520 Magellan passed the straits which bear his name, and his vessel, crossing the Pacific and Indian oceans, returned to Europe by way of the cape of Good Hope, having for the first time circumnavigated the globe. The W. coast of America, with the exception of that portion N. of the bay of San Francisco, was explored before the middle of the 16th century, while considerable progress was made by the Spaniards in acquiring a knowledge of the interior of South America. At the same time discovery in the East advanced with rapid strides. Within 20 years from the time of Gama's arrival in India, the coasts of E. Africa, Arabia, Persia, Hindostan, and Further India had been explored, and many of the islands of the great archipelago discovered. In the 16th and 17th centuries the progress of astronomical science led to a general revision of Ptolemy's tables of latitude and longitude, which had for ages been received with implicit confidence, but which more accurate observations now proved to be generally erroneous. In the 18th century many learned and laborious writers, among whom M. d'Anville may be particularly mentioned, applied themselves to the rectification of the whole system of ancient geography, and to the identification of ancient with modern countries, cities, rivers, mountains, and other features. The desire to discover a shorter route to India than those by Cape Horn and the cape of Good Hope led the English and the Dutch in the 16th century to make daring and persevering efforts to effect a N. E. and a N. W. passage. For a long time the opinion prevailed that the northern extremity of America terminated, like the southern, in a point or cape, by sailing round which the mariner could enter the Pacific ocean and make his way to India. The expeditions of Sir Hugh Willoughby and Richard Chancellor in 1553, of Frobisher in 1576-'8, of Davis in 1585-'8, of Barentz in 1594-'6, in search of this northern route, greatly enlarged our knowledge of the arctic regions, and especially of the N. E. part of North America. So too in the succeeding century a similar result followed from the voyages of Henry Hudson, in 1607-'11, and of William Baffin in 1616. It was not till the

latter part of the 18th century, however, that the great breadth of the upper part of North America became fully known from the investigations of Capt. Cook in his voyages to the Pacific. The determination of the distance from Behring's straits to the E. coast of North America dispelled for a time all expectation of a N. W. passage. It was supposed that the continent stretched in one unbroken mass to the pole. The discoveries of Hearne in 1771 and of Mackenzie in 1789, by showing that an ocean bounded America on the north, dispelled these ideas, and in 1818 the attempt to effect the N. W. passage was revived by an expedition commanded by Capt. Ross. This was the beginning of a series of English and American expeditions to the arctic regions, which have within a few years greatly advanced our knowledge of that part of the world, though without attaining the object for which they were commenced. (See ARCTIC DISCOVERY.) Early in the 17th century the Dutch, while seeking for a southern continent whose existence was supposed necessary to balance the northern continent, discovered Australia, which they called New Holland, and explored a considerable portion of its coasts. In 1642 Tasman discovered Van Diemen's Land, or Tasmania, as it is now called. Soon afterward he discovered New Zealand and several of the Polynesian groups. His explorations proved that New Holland was an island, and not a part of the southern continent. The famous Capt. Cook in his voyages, 1768-'79, made strenuous efforts without success to discover the southern continent. He however added largely to geographical knowledge by his survey of the Pacific ocean and its innumerable islands. An expedition sent out by the United States in 1838, under command of Lieut. Wilkes, succeeded in 1840 in discovering a continent within the antarctic circle, portions of which were also seen in the same year by the French and English navigators Dumont d'Urville and Sir James Ross. (See ANTARCTIC DISCOVERY.) Our acquaintance with the interior of Asia has been greatly advanced within the last two centuries by a multitude of travellers, prominent among whom have been the Jesuit missionaries, so that at the present day our general knowledge of the continent of Asia is tolerably complete. No great *terra incognita* remains, though fuller and more precise information about the vast regions known as Tartary is much to be desired. The travels of Humboldt, of Lewis and Clark, and of Fremont have perfected our acquaintance with the interior of the American continent. The interiors of Australia and of Africa are however still only partially known. Much has been done for the exploration of the former by Sturt, Eyre, and Leichhardt, while in Africa a host of travellers have struggled for a century past to penetrate the mystery which from the remotest period has enveloped that great division of the globe. Foremost among the African explorers we may name James Bruce, Mungo Park, Major Denham, Lieut. Clapperton, Richard Lander, Cap-

tain Burton, Dr. Livingstone, and Dr. Barth. Great additions have been made to our knowledge of the countries on the upper Nile by expeditions recently sent by the pasha of Egypt, which have penetrated far beyond the region so long assigned on our maps to the mountains of the Moon. These expeditions and the researches of Barth, Burton, Livingstone, and the missionaries Rebmann and Krapf, have left in obscurity only a portion of that part of Africa which lies between lat. 10° N. and 10° S. The veil that still hangs over that will doubtless soon be dispelled, so that of the whole earth nothing will remain wholly unknown to the science and the curiosity of civilized man except the frozen regions round the poles. The remarkable progress of geographical discovery within the last half century has been thus summed up by Mr. Bayard Taylor: "Within that time all the principal features of the geography of our own vast interior regions have been accurately determined; the great fields of central Asia have been traversed in various directions from Bokhara and the Oxus to the Chinese wall; the half-known river systems of South America have been explored and surveyed; the icy continent around the southern pole has been discovered; the N. W. passage, the *ignis fatuus* of nearly two centuries, is at last found; the Dead sea is stripped of its fabulous terrors; the course of the Niger is no longer a myth, and the sublime secret of the Nile is almost wrested from his keeping. The mountains of the Moon, sought for through 2,000 years, have been beheld by a Caucasian eye; an English steamer has ascended the Chadda to the frontiers of the great kingdom of Bornou; Eyre, Leichhardt, and Sturt have penetrated the wilderness of Australia; the Russians have explored the frozen shores of northern Siberia, and descended from Irkutsk to the mouth of the Amoor; the antiquated walls of Chinese prejudice have been cracked, and are fast tumbling down; and the canvas screens which surrounded Japan have been cut by the sharp edge of American enterprise. Such are the principal features in the progress of modern discovery. What half century since the form of the earth and the boundaries of its land and water were known, can exhibit such a list of achievements?"—The literature of geography has within a few years undergone a marked change. Instead of the formal, regular descriptions of the earth and its inhabitants, which were once in vogue, gazetteers and geographical dictionaries are now popular. (See GAZETTEER.) The progress of geography has been much aided during this century by the efforts of zealous geographical societies, among which those of England and France are particularly distinguished. Their transactions, issued periodically, contain a vast and constantly increasing mass of information. Among the best works on geography are *Précis de la géographie universelle, ou description de toutes les parties du monde sur un plan nouveau, d'après les grandes divisions du globe*, by Malte-

Brun (Paris, 1810-'37), of which a translation into English was made by the late James G. Percival, 1827-'32, under the title of "Universal Geography" (6 vols. 8vo., Philadelphia, 1827-'32); "An Encyclopædia of Geography," by Hugh Murray (1 vol., London, 1835; 2 vols., Philadelphia, 1836; new edition, 1857); Karl Ritter's great work, *Die Erdkunde im Verhältnisse zur Natur und Geschichte des Menschen*, and many other works by the same author and by his followers, Von Rougemont, Von Roen, Berghaus, Volger, Merleker, Meinicke (*Lehrbuch der Geographie*, 1857), and Klöden (*Handbuch der Erdkunde*, 1858). Smith's "Dictionary of Greek and Roman Geography" (2 vols. 8vo., London, 1854-'7) contains a full and methodical compendium of all that remains of the geographical knowledge of the ancients.

GEOLOGY (Gr. *γῆ*, the earth, and *λογος*, discourse), the science which treats of the structure of the earth and the methods by which its materials have been arranged. Its study embraces all matters that form the portion of the earth within the reach of man's observation; it brings them together into appropriate groups, and investigates the changes through which they have passed. It thus divides itself into 2 departments, descriptive geology and physical geology, the latter treating especially of the causes of production, or of geological dynamics. In this department a close connection and mutual dependence are perceived at the outset between this and the other physical sciences. Some of the laws which affect the distribution and condition of masses upon the surface of the earth are more perfectly comprehended in the grander scale of their action, as they influence the movements and condition of the heavenly bodies; others are to be explained only by reference to meteorological agencies, as the rains, frost, winds, &c.; others by the mechanical forces exerted by running water; and a large class depend for their position on the chemical operations that are everywhere going on, changing the conditions of matter, and even in the still depths of the sea and the apparently unchangeable strata deeply buried in the earth, producing grander results than those displayed by the noisy eruptions of the volcano. So closely are all departments of nature linked together, that even the habits of insignificant insects, as already explained under CORAL, must be studied to account for the formation of geological structures of vast extent; and under ALLUVIUM it is shown that the infusoria, the minutest organic forms that we can recognize, make up by their shelly remains the substance of extensive deposits. The vegetable kingdom, too, has contributed an important share to the materials that compose the strata of the earth; and botany is thus enlisted to elucidate geological phenomena, while its own sphere is enlarged by the strange flora of past epochs faithfully preserved in geological herbaria. Many of the rocks are found filled with shells, and containing relics of various other animal forms; whence

conchology and zoology become aids to geological investigations as requisite as botany, and are themselves similarly advanced by the new field thus opened to them. Comparative anatomy also has been so extended by the demands of geology for an explanation of the true character of the bones and other animal remains preserved in the rocks, and differing strangely from all belonging to known living forms, that this may be regarded almost as a new science.—The changes that have taken place in the inorganic and organic world introduce in their study considerations of time and progress, and the science is found to partake largely of the historical character. It abounds with records of past events, and the geologist, as *Ouvier* remarked, is an antiquary of a new order. Its historical element is regarded by *Lyell* as so prominent that he defines geology simply as “the science which investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature.”—In the present article little more will be attempted than to present a general sketch of the history and progress of geological science, a reference to some principal objects of its pursuits, and the systems of classifying the groups of rock generally adopted. The history of the science as developed in Europe is minutely traced in the familiar work of *Lyell*, “*Principles of Geology*,” in which the whole subject may also be most advantageously studied; while for special details reference may be made to the names of the formations and of the minerals, metals, &c., in their alphabetical arrangement in this cyclopædia. (See also MINERALOGY, and PALÆONTOLOGY.)—From the earliest times the structure of the earth has been an object of interest to man, not merely on account of the useful materials he obtained from its rocky formations, but also for the curiosity awakened by the strange objects it presented to his notice. The south and west of Asia and much of the country bordering the Mediterranean were particularly favorable for directing attention to geological phenomena. Earthquakes were of frequent occurrence, changing the relative position of sea and land; volcanoes were seen in operation, adding layers of molten rock to those of sand and mud filled with the shells of the Mediterranean; the strata in the hills abounded in evidences of similar collections of vestiges of marine life far removed from access of the sea, and yet unchanged during the period of human observation and tradition; the Ganges and the Nile pouring forth their vast sedimentary accumulations were plainly building up the deltas at their mouths, and the broad valleys reaching far up their course were unmistakable productions of the same series of operations in remote periods of time. These phenomena could not escape the attention of the philosophers among the ancient Egyptians and Indian races; and their influence is perceived in the strange mixtures of correct observations and extravagant conceits which make up their cosmogonies or universal theories of the creation. In the first

chapter of the ordinances of *Manu* alternating periods of destruction and of renovation are distinctly recognized, extending in eternal succession throughout the whole assemblage of locomotive and immovable creatures, each period comprehending a duration of many thousand ages. The Greek schools of philosophy recognized these phenomena, which were clearly enunciated by *Ovid* in presenting the doctrines of *Pythagoras*. Remarkably free from extravagant statements, they were applied to prove a system of perpetual change slowly modifying the surface of the earth. *Aristotle* recognized the interchanges constantly taking place between land and sea by the action of running water and of earthquakes, and remarked how little man can perceive in the short span of his life of operations extending through the eternity of time. *Strabo* distinctly applied the rising up of lands, not merely of small tracts, but of continents also, by earthquake convulsions, to account for the perplexing phenomenon of beds of marine shells contained in the interior of hills far distant from the sea. Arabian philosophers of the 10th century are cited who entertained similar views of the changes going on and their causes; and in an Arabian manuscript of the 18th century, preserved in the royal library at Paris, the changes that may occur in successive periods of 500 years are happily presented in the beautiful narrative of the mythical traveller *Kidhz*.—The Italian philosophers in the early part of the 16th century were the first to engage in systematic investigations concerning the true nature of fossil shells. Their abundance in the strata of the sub-Apennine range could not fail to arrest attention and excite inquiries, now the more perplexing from the limited time allowed in popular belief to the past duration of the earth, and from the general persuasion that no great catastrophe except the Noachian deluge could have occurred to modify its surface. Various fanciful explanations were therefore adopted in the spirit of the scholastic disputations, and for 3 centuries argumentations were sustained with much spirit on the questions: first, whether fossil remains had ever belonged to living creatures; and secondly, admitting this, whether all the phenomena could not be explained by the deluge of Noah. Among those distinguished for the soundness of their views in the commencement of this controversy are *Leonardo da Vinci*, the celebrated painter, who died in 1519, and *Fracastoro*, whose attention was engaged by the multitude of curious petrifications which were brought to light in 1517 in the mountains of Verona in quarrying materials for repairing the city. He exposed the absurdities of the theories which referred the petrifications to a certain plastic force in nature that could fashion stones into organic forms, and showed the inadequacy of the traditional deluge to collect marine fossils that form solid strata of the earth. About this time collections of these curiosities were made for public museums and

private cabinets; they were deposited in the museum of the Vatican at Rome, and that of Canceolariis at Verona became famous for them. Descriptive catalogues of these collections were published; and as early as 1565 appeared one of the collection of John Keutman in Gessner's work *De Rerum Fossilium, Lapidum, et Gemmarum Figuris*. In 1580 Palissy was the first who dared assert in Paris that fossil remains of testacea and fishes had once belonged to marine animals. The truth, however, made but slow progress in the face of the established prejudices of the times. In 1669 Steno, professor of anatomy at Padua, published his work *De Solido intra Solidum naturaliter Contento*, in which he proved the identity of the fossil teeth found in Tuscany with those of living sharks, and the close similarity of the fossil testacea to living species; he traced their progressive change from unaltered shells to solid petrifications, and recognized the distinction between formations deposited by salt and by fresh water, and that some were of an earlier period than the introduction of plants and animals upon the earth. But neither he nor Scilla, the Sicilian painter, who in his Latin treatise on the fossils of Calabria, published in 1670, and illustrated by good engravings, ably maintained the organic nature of fossil shells, ventured to refer their occurrence in the strata to any other cause than the Mosaic deluge. Leibnitz, the great mathematician, in his *Protogæa*, published in 1680, first proposed the theory of the earth having originally been a burning luminous mass, which since its creation has been cooling down, and as it cooled received the condensed vapors which now compose its crust. In one stage of its formation he believed it was covered with a universal ocean. From these materials Leibnitz traced two classes of primitive formations, the one by refrigeration from igneous fusion, the other by concretion from aqueous solution. The first recognition of the arrangement of the earthy materials in strata, continuous over large areas, and resembling each other in different countries, appears to have been by Dr. Lister, who sent to the royal society in 1683 a proposal for maps of soils or minerals. He also believed that species had in past epochs become extinct. Dr. Robert Hooke prepared near the close of the 17th century a "Discourse on Earthquakes," which contains the most philosophical views of the time respecting the nature of fossils and the effects of earthquakes in raising up the bed of the sea. William Woodward was a distinguished observer of the geological formations of Great Britain, and perceived that the lines of outcrop of the strata were parallel with the ranges of the mountains. He formed about the year 1695 a collection of specimens which he systematically arranged and bequeathed to the university of Cambridge. For this he purchased the original specimens and drawings of fossil shells, teeth, and corals of Scilla, the Sicilian painter noticed above. But his geological system was cramped by the attempt to

make it conform to the received interpretation of the scriptural account of the creation and deluge. The Italian geologists Vallisneri in 1721, Moro in 1740, and Generelli in 1749, advanced the most philosophical views yet presented respecting the fossiliferous strata, and sustained them by original observations made by the first two throughout Italy and among the Alps. Moro endeavored to make the production of strata correspond in time to the account of the creation of the world in 6 days, and hence was compelled to refer them to volcanic ejections, which by floods, he imagined, were distributed over the surface of the earth and piled up in strata with marvellous celerity. Buffon advanced views respecting the formation and modification of mountains and valleys by the action of water in his "Natural History" (1749), a portion of which, contained in 14 propositions, he was required by the faculty of theology in Paris to renounce. This he did in his next work, accompanying the formal abandonment of what he had written contrary to the narration of Moses with a declaration of belief of all contained in the Scripture about the creation, both as to order of time and matter of fact.—Geology did not begin to assume the rank of an important science until its application to the practical purposes of mining was first pointed out in the last quarter of the 18th century by Werner, professor of mineralogy in the school of mines at Freiberg in Saxony. This distinguished man by his wonderful genius attracted pupils from distant countries, and sent them forth enthusiastic geologists and advocates of the views he had conceived from his imperfect observation of the geology of a small portion of Germany. He taught the systematic order of arrangement of the strata, adopting nearly the same divisions that had been proposed 50 years previously by Lehmann, a German miner. He explained their production as the result of precipitation from a common menstruum or "chaotic fluid," which he supposed had once covered the whole surface of the earth. As expounded by Jameson in 1808, the first precipitates from this ocean were chemical, and produced the crystalline rocks which lie at the base of all the others, and which he designated as the primitive class. They included the granitic rocks and those since called metamorphic, as gneiss, mica slate, clay slate, serpentine, &c. The 2d class comprised the rocks he calls transition, certain limestones, flinty slate, gypsum, graywacke, and trap, most of which are probably now included in the silurian formation. They were supposed to have been formed during the transition of the earth from its chaotic to its habitable state, and to have been partly chemical and partly mechanical in their origin, the latter worn down by the waves and currents. The 3d class contained the rocks denominated *Pleista*, because as observed in Germany they were disposed in horizontal or flat strata. In this was the coal formation, rock salt, chalk formation, old red

sandstone, numerous floetz limestones and floetz trap. They were supposed to have been formed while animals and vegetables existed in numbers, and to have been partly chemical and partly mechanical in their origin. They were not regarded as corresponding to the "secondary" of the French geologists, as this division comprehended some of Werner's transition class; still the division secondary is sometimes found among Werner's, as it was used by Lehmann. The 4th class contained the alluvial rocks, those produced on the land, as peat, sand and gravel, loam, bog iron ore, calc tuff, &c., being understood to comprise all above the chalk excepting the volcanic; the tertiary are thus entirely overlooked. The 5th class comprised the volcanic rocks, the pseudo-volcanic, and the true volcanic—the former being real or imaginary products of the combustion of coal and sulphurous matters, the latter of real volcanoes. These formations were supposed to be systematically arranged; the later formed either entirely covering the older, or, when these form a central mountain mass, encircling this, so that the "outgoings" of the strata (meaning their upper edges or lines of outcrop) form circles; those of the later formed groups being successively larger. The basin and trough-shaped deposits were also recognized, in which the outgoings of the newer strata became successively smaller. The strata, it was understood, were subject to local disturbances from portions sinking into subterranean cavities, and members might be wanting in some localities, but whenever present must be found in their proper position in relation to the rest. Basalt, which in Saxony and Hesse was seen capping the hills of stratified rocks, he inferred must be of the same series of precipitated formations, although many other geologists of Werner's time had fully established the analogy between this rock and modern lavas. The observations of Desmarest, especially in the district of extinct volcanoes in Auvergne, made in 1768, are referred to by Lyell as most clearly tracing the origin of the basalts to the craters of the volcanoes. A new controversy now arose, which for many years was waged with animosity and bitterness unprecedented in all other disputes of this class. Geologists throughout Europe were divided into the two classes of Neptunists, who advocated the production of the rocks by aqueous deposition alone, and Vulcanists, who attributed the origin of many of them to the action of fire. Hutton of Edinburgh was the acknowledged leader of the latter party. He had studied geology for himself in different parts of Scotland and England, and formed his own conclusions, which he ably sustained. He was the first to announce that geology had no concern with questions as to the origin of things, but that the true field of her investigations was limited to the observation of phenomena and the application of natural agencies to explain former changes. His friend Sir James Hall showed by actual experiment that the prismatic

structure of basalt might result in cooling from a state of igneous fusion; and Hutton himself rejoiced to find in the Grampian hills the granite branching out in veins, which extended from the main body through the contiguous micaceous slates and limestone, thus indicating its having been in a fused state, and this subsequent to the production of Werner's later formed rocks. This discovery soon led to questioning the existence of any primitive class of rocks, the origin of which lay beyond the reach of the present order of things; and the announcement made by Hutton: "In the economy of the world I can find no traces of a beginning, no prospect of an end," may well have startled men of science and shocked the religious public in the sensitive condition to which it had been brought by the infidel doctrines promulgated in the latter part of the last century, especially by men of letters of France. The Vulcanists came to be classed with the enemies of Scripture, the true object of investigation was lost sight of, and the controversy was continued with such animosity that the party names at last became terms of reproach, and many geologists avoided being involved in it. Workers in the field, however, were collecting new and valuable data that were to give to the science a more exact character. William Smith, a civil engineer, prepared in 1793 a tabular view of the strata near Bath, tracing out their continuity over extensive areas, and recognizing them by the fossils they contained. This method of identification and of arranging strata in their true positions he taught himself, and was the first to promulgate in England. With extraordinary perseverance he continued to prosecute his work alone, travelling on foot over all England, freely communicating his observations, and in 1815 he completed a geological map of the whole country. In France the importance of fossils as characteristic of formations was also beginning to be appreciated. De Lamarck and Defrance earnestly engaged in the study of fossil shells, and the former in 1802 reconstructed the system of conchology to introduce into it the new species collected by the latter in the strata underlying the city of Paris and quarried for the construction of its buildings. Six years previous to this Cuvier had established the different specific character of fossil and living elephants, which opened to him, as he stated, views entirely new respecting the theory of the earth, and determined him to devote himself to the researches which occupied the remainder of his life. In 1807 the geological society of London was established, with the professed object of encouraging the collection of data, multiplying and recording observations, with no reference to any "theories of the earth." Its active members completed the classification and description of the secondary formations of Great Britain, so well commenced by William Smith; while at the same time the tertiary formations were thoroughly investigated by Cuvier, Brongniart, and others in Paris. Thus



each country contributed to the advancement of geological science in the department connected with its most prominent formations—Germany in that of the lower stratified and metamorphic rocks, and especially in the mineralogical structure of these, while in Scotland the character of the granitic rocks had been more particularly elucidated, in England that of the secondary strata and their order of arrangement, and in France the tertiary.—The great principles gradually developed by these observations were: that the materials of the stratified rocks were sedimentary deposits that had slowly accumulated in the beds of ancient seas and lakes; that each stratum represented a certain period of time during which its materials were gathered, and that this period was characterized by its peculiar group of organized beings, the vestiges of which were buried and remained with it as records of the condition of this portion of the earth during this time. The piles of strata of various kinds indicated changes in the character of the deposits introduced, sandstones derived from sand alternating with shales derived from muddy and clayey deposits, and with calcareous strata, whose origin may have been in marl beds or coralline structures. The long succession of these strata, in connection with the evidences of their slow accumulation, observed in the undisturbed condition of the fossil remains they contained, bore witness to long periods of time occupied in the production of a single group of strata constituting but a minor division of one of the formations. The lapse of long periods of time was also indicated by the fossils becoming constantly more and more unlike existing species as found in beds of older date. The same localities, too, presented in their successive beds some that were filled with marine vestiges alone, corallines and sea shells clustered together as found in tropical oceans, and in layers of such thickness that ages must have passed while they were quietly accumulating; and above or below these were found other strata indicating that the surface was at another period covered with fresh water, the organic vestiges they contained being only of the character of those belonging to ponds and rivers; and yet again these localities became dry land, and were covered with the forests of tropical climes, and peopled with numerous strange species of animals, whose nearest living analogues are met with only in hot countries. Such changes as these also plainly marked slowly progressing revolutions, the period of which no one could compute by years. It was apparent that the sediments had collected as beds of sand and clay now collect in seas and lakes, and especially about the mouths of large rivers; but it was only in such as were evidently the product of the streams of the present day that the organic vestiges were recognized as belonging entirely to familiar species. In these alone were discovered any relics of man or any indications of his existence; and here they were not wanting, for fragments torn off

by the anchor from the newly formed sandstone floor of the sea brought up the works of his hands already entombed as fossils; and in the calcareous strata in process of formation and filled with recent species of shells has been found his skeleton. But with the first step back, even to the strata that form the soil of living peat beds, the bones of extinct gigantic mammalia introduce us to strange groups of animals, and no positive evidence of a satisfactory nature is afforded, either in the strata or in tradition, that man was their contemporary. Thus in the closest connection, geologically speaking, are we presented with the most striking examples of other great principles developed by geological research, viz., the extinction of old and the introduction of new species.—In consequence of the system of observation and close investigation now established, geology lost its highly speculative character, and rapid progress continued to be made in acquiring correct information of the arrangement of the strata of different countries. While the defects of Werner's classification were exposed, the general plan of it was seen to be founded in nature, and attention was directed to collecting everywhere the materials for filling out the vertical column of the rocks, as well as mapping them throughout their horizontal range. In every country some formations could be recognized, from which as a base a local classification might proceed to contiguous groups, and thus at last the whole be included in one system of classification. So the work of descriptive geology has ever since been going on, new discoveries continually adding to its completeness; and yet, as in all other investigations into the works of an infinite Author, with no promise of approaching the object in view, viz., the compilation of a perfect system, which in this case should present a full chart of the rocks from the lowest or oldest to the uppermost or most recent. Strata lying in juxtaposition in one region, when identified in another, are found to be separated by the interpolation of a new series; and again, in tracing out over broad areas a group of sedimentary strata, they are found gradually to assume new features, and even to undergo an entire change of chemical composition. So it would be if the vast submarine surface now receiving the sediments deposited by the Gulf stream were uplifted to form a new continent; the geologists of a future period, exploring its strata among the forests and beneath the soil of its north-eastern hills, would find them composed of the finest materials, such as may have been deposited from chemical solution, and differing materially from the coarse sediment distributed further to the south-west. The fossil remains too would be different, though all belonging to the same epoch of production, and included in the same geological group. Were the beds of the great northern lakes at the same time also exposed to observation, their sediment and vestiges would be found essentially different from those of the strata of marine

origin; and yet certain characteristics would unmistakably refer the production of them all to the same period in the world's history—a period subsequent to the introduction of man. From this explanation it follows that all stratified formations must be of limited area and thinning away at their edges, presenting the shape of lenticular sheets lapping upon each other.—In 1819 the geological society published a map of England greatly improved upon that of Smith by the labors of Mr. Greenough and his friends. About the same time Leopold von Buch prepared a similar map of a large part of Germany. A geological survey of France was ordered in 1822 by the French government, by which a complete geological map of France was finally constructed in 1841. M. Brongniart de Villiers, professor in the school of mines, was appointed to take charge of the work, and with him were associated Elie de Beaumont and Dufrenoy. The attention of these geologists was first given to an examination of the strata above the coal formation in England, where they had been most carefully studied, and particularly described by Conybeare and Phillips in their treatise on the "Geology of England and Wales" (1831). The secondary strata of Germany also were familiar to geologists; and both countries consequently furnished important points of reference for the arrangement of the groups of France. The chalk formation of Paris, the upper member of the secondary, served as the starting point, and proceeding from this they examined in detail the lower strata as they appeared successively emerging from beneath it, and identified them as they could with the corresponding groups of other countries. Such is the method ever since pursued, by which our knowledge of the strata which make up the outer crust of the earth has been systematically extended. The importance of the organic remains found in the rocks has been more and more appreciated, and the shells which constitute the chief portion of these have been most thoroughly studied; for while the different formations or groups of strata may contain numerous similar beds of limestone, sandstone, slates, and shales, not to be distinguished by their mineral characters, and which frequently cannot be traced to their meeting with other known formations by which their place or relative positions may be determined, the fossils show no such indiscriminate distribution; but each era was characterized by its peculiar group of animated beings, and if their arrangement is understood it follows that the position of any stratum in which the fossils are recognized must also be determined. A single species may in some cases be peculiar to one member of a geological formation, and serve wherever the fossil is found to identify the rock; but usually in different countries their identification by fossils is dependent upon characteristic genera and the order of succession of their principal groups. This branch of the subject will be more particularly treated in the article *PALÆONTOLOGY*.—

Before proceeding to a consideration of the classifications adopted by modern geologists, a rapid sketch will be presented of the progress of the science in the United States. In the latter part of the last and early part of the present century papers upon geological subjects occasionally appeared in the volumes of the philosophical society of Philadelphia, the "Transactions of the Boston Academy," and in other scientific journals. The character of these papers is almost exclusively descriptive. There is, however, a theory of the earth proposed by Franklin in the "Philosophical Transactions" of 1798. The 6th volume of the same journal presented the paper of Mr. William Maclure, read Jan. 20, 1809, entitled "Observations on the Geology of the United States, explanatory of a Geological Map." The author of this paper had undertaken a more arduous and gigantic work even than that which was occupying William Smith of England; it was no less than a geological survey of the United States alone and at his own expense—a work which entitled him to the appellation he has received of the father of American geology. In this pursuit he crossed the Alleghanies no fewer than 50 times, visited almost every state and territory in the Union, and for years continued his labors mostly among those who could have no appreciation of his objects. He had visited nearly all the mining districts of Europe, and was hence well qualified, for one of that period, to recognize the corresponding formations of the two continents. He traced out the great groups of strata then designated, as the transition, secondary, and alluvial, in their range from the St. Lawrence to the gulf of Mexico. The tertiary, however, he did not recognize, owing to the absence of the chalk formation, the upper member of the secondary, which in Europe, being largely developed and most conspicuous, marks the strata of more recent origin lying above it as tertiary. He continued his explorations after this report, and in May, 1817, presented another to the society, accompanied by a colored map and sections. His observations were also extended in 1816 and 1817 to the Antilles, and a paper upon the geology of these islands was published in the 1st volume of the "Journal of the Academy of Natural Sciences." Prof. Silliman of New Haven, educated to the profession of the law, was induced by President Dwight of Yale college to qualify himself for the departments of natural science, particularly chemistry; and with this view he spent some time previous to 1806 in England and Scotland. In Edinburgh he became familiar with the discussions of the Wernerians and Huttonians in that transition period, as he styles it, between the epoch of geological hypotheses and dreams, which had passed by, and the era of strict philosophical induction, in which the geologists of the present day are trained. The interest excited by this controversy could not fail to direct his tastes toward the new science, and he returned to become its zealous promoter, for half a century

or more aiding to elucidate the geology of his country, inspiring the enthusiasm of others, and furnishing in the "American Journal of Science" an organ for the diffusion of scientific knowledge. At that period (1804-'5), he states, geology was less known in the United States than mineralogy. Most of the rocks were without a name, except so far as they were quarried for economical purposes, and classification of the strata was quite unknown. Dr. Archibald Bruce of New York commenced in 1810 the publication of a journal devoted principally to mineralogy and geology, the earliest purely scientific journal, as Prof. Silliman remarks, supported by original American communications. It was well received at home and abroad, but appeared only at wide intervals, and did not reach beyond the 4th number. The mineralogical collections at the principal colleges, and others belonging to scientific men mostly in New York, promoted inquiry and observation concerning the geological relations of the minerals and their distribution. The admirable treatise on mineralogy by Prof. Parker Cleaveland, published in 1816, fostered while it gratified this spirit of inquiry. In 1818 the brothers Prof. J. F. Dana and Dr. Samuel L. Dana published a detailed report on the mineralogy and geology of the vicinity of Boston. In the same year the "American Journal of Science" was first published, which has continued ever since to be the chief periodical American recorder of the progress of the sciences. The next year the American geological society held their first meeting at New Haven, where they continued to meet annually for several years afterward. The importance of geological explorations, with the view of thereby ascertaining the agricultural and mineral capacities of large districts, was beginning to be appreciated by communities and public bodies. In 1820 a geological survey of the county of Albany, N. Y., was made under the direction of the agricultural society of the county by Prof. Amos Eaton and Dr. T. R. Beck. Two years afterward Rensselaer and Saratoga counties were also thus explored. Prof. Eaton was also engaged by Gen. Stephen Van Rensselaer to make at his expense a geological survey of the country adjacent to the Erie canal. The result of this was published in 1824 in a report of 160 pp. 8vo., with a profile section of the rock formations from the Atlantic ocean through Massachusetts and New York to Lake Erie, the Rev. Edward Hitchcock furnishing many of the details through Massachusetts. The first geological survey made by state authority was that of North Carolina in 1824 and 1825. The progress of these public undertakings is presented in the table upon the following page. The names are of the principal geologists, and most of the assistant geologists who reported under their own names. Beside these public surveys are others of importance made in connection with the government explorations between the Mississippi and the Pacific. Those of Schoolcraft, Nicollet, and Fre-

mont are particularly worthy of reference. Nicollet, an accomplished astronomer from Savoy, devoted 5 years, from about 1838, to explorations made at his own expense in the western territories; and from 1839 to the time of his death in 1848 he was in the service of the U. S. government preparing a map of these territories, which was published. Explorations have been recently made in connection with the survey of the Pacific railroad across the Rocky mountains, and in California by Jules Marcou, W. P. Blake, Dr. Antisell, and Dr. Newberry. American geology has also been greatly elucidated by the labors of private explorers, especially by Lyell in his two visits to the United States. Agassiz's contributions to its natural history are highly important for their geological bearings, likewise the earlier investigations in comparative anatomy of Dr. R. Harlan and of Dr. S. G. Morton, and those more recently made by Dr. Jeffries Wyman. Mr. Isaac Lea and Mr. William C. Redfield have made valuable contributions to the science from original investigations. For the grouping and identification of the members of the palæozoic formations over their wide range from the seaboard to the Rocky mountains, American geology is largely indebted to the labors of Prof. James Hall of Albany, who has acquired the most exact knowledge of their fossils, and materially advanced the science of palæontology. Our knowledge of the growth of coralline structures and their relation to the production of the calcareous formations of remote periods, as well as of other kindred geological subjects, has been greatly extended by the elaborate treatises of Prof. James D. Dana embodying the results of his observations made on the U. S. exploring expedition of Com. Wilkes from 1838 to 1842. The British provinces of North America have been explored by private enterprise and public patronage. A notice of the mineralogy and geology of Nova Scotia, with illustrations and a geological map, by Dr. O. T. Jackson and Francis Alger, Esq., of Boston, was published in the "American Journal of Science," 1828-'9; and in 1831 the same memoir, extended by further observations collected in a second visit to Nova Scotia, appeared in the "Transactions of the American Academy" at Boston. Lyell also has described interesting features exhibited in the coal measures of this peninsula. Extensive surveys have been made in Nova Scotia by Prof. Dawson, now of the McGill college, Montreal, and his work entitled "Acadian Geology" appeared in 1857. New Brunswick authorized a survey, the report of which was published by A. Geener in 1839. Canada also passed a similar act in Feb. 1845, and Sir W. E. Logan has been actively engaged in carrying out this great work; his reports, accompanied by those of his assistants, T. Sterry Hunt, A. Murray, and others, having annually appeared since 1847. Newfoundland has been surveyed, under the government of the island, by Mr. Jukes, who has since had charge of the geological survey of Ireland.

Public geological surveys.	Years.	Chiefs of survey, &c.	Reports.
North Carolina.....	1824-'25	Denison Olmsted.....	2 annual.
South Carolina.....	1825	E. Emmons.....	1854.
".....	1826	Lardner Vanuxem.....	In the newspapers only.
".....	1842-'45	M. Tuomey.....	{ Report, 1 small 4to., 1848 (present- ed 1846).
Massachusetts.....	1856-'59	O. M. Lieber.....	3 annual reports.
resurvey.....	1830-'33	Edward Hitchcock.....	{ Final, 1840, 2 vols. 4to., and 1 vol. 4to. on fossil footprints, 1859.
Tennessee.....	1837-'40	G. Troost.....	5 annual reports.
U. S. territory of Arkansas.....	1839	James M. Safford.....	1st, 1856; 2d, 1859-'60.
Maryland.....	1835	G. W. Featherstonhaugh.....	1856. (?)
resurvey.....	1834-'40	J. T. Ducatel, J. H. Alexander.....	Several annual.
New Jersey.....	1853	Phillip T. Tyson.....	
resurvey ordered.....	1836-'38	H. D. Rogers.....	Final, 1840.
Virginia.....	1853	William Kittell and Geo. H. Cook.....	8 annual.
New York.....	1855-'56	William B. Rogers.....	Several annual.
Pennsylvania.....	1832-'42	{ L. Vanuxem, W. W. Mather, E. Em- mons, James Hall, T. A. Conrad, L. C. Beck.....	{ 4 vols. 4to. geology, 1 mineralogy, 3 paleontology, and 2 more to be published by act of 1855.
Maine.....	1836-'42	H. D. Rogers, &c.....	6 annual; final, 1858 and 1859, 2 vols. 4to.
Delaware.....	1851-'55	C. T. Jackson.....	3 annual.
Ohio.....	1836-'39	James C. Booth.....	9 annual; final, 1840.
Connecticut.....	1837-'38	{ W. W. Mather, S. P. Hildreth, John Locke, C. Briggs, J. W. Foster.....	Several annual.
Indiana.....	1867	C. U. Shepard, J. G. Percival.....	By Prof. Shepard in 1837; by Dr. Percival in 1842.
Kentucky.....	1837	D. D. Owen.....	8 vols. 8vo., 1856 and 1858.
".....	1838	W. W. Mather.....	
Michigan.....	1856-'59	D. D. Owen, S. S. Lyon, Joseph Les- ley, jr.; Leo Lesquereux, paleont.	7 annual reports.
Lake Superior U. S. land district..	1837-'48	Douglas Houghton.....	{ 1 report by Jackson.
Rhode Island.....	1847-'49	C. T. Jackson, succeeded by J. W. Foster and J. D. Whitney.....	{ 2 by Foster and Whitney.
New Hampshire.....	1839-'40	C. T. Jackson.....	Final, 1840, 1 vol. 8vo.
Mineral lands, Iowa and Wisconsin	1840-'41	C. T. Jackson.....	Final, 1 vol. 4to.
Vermont.....	1839	D. D. Owen, John Locke.....	1840.
Missouri.....	1845-'46	C. B. Adams.....	8 annual.
Iowa.....	1853	Edward Hitchcock.....	
California.....	1858-'55	G. C. Swallow, Dr. A. Litton, F. B. Meek, Dr. B. F. Shumard.....	{ 2 annual, survey in progress.
Wisconsin.....	1855	James Hall, J. D. Whitney, chem. and min., A. H. Worthen, E. A. Cooley, B. S. Lyman.....	{ 2 vols., 1858 and 1859.
resurvey.....	1855	Dr. J. B. Trask.....	
Mississippi, act passed.....	1857-'59	E. Daniels, succeeded by J. G. Percival.....	1854.
".....	1850	James Hall, E. Daniels, E. S. Carr. Dr. John Millington.....	1857.
".....	1853	B. L. C. Wallis.....	
".....	1854	L. Harper, E. W. Hilgard.....	
Illinois, act passed.....	1850	J. G. Norwood, succeeded by A. H. Worthen.....	Report to U. S. government.
Oregon.....	1859-'58	John Evans.....	1858.
Kansas.....		Maj. F. Hawn.....	
Mexican boundary survey.....	1857	Dr. C. C. Parry, Dr. Arthur Schott. B. F. Shumard and G. G. Shumard..	8 annual reports; last, 1859.
Texas.....	1853	M. Tuomey and Mallet.....	1st annual, 1859.
Alabama.....	185-	D. D. Owen.....	
Arkansas.....	1856		
Louisiana.....			

—From the time of Werner's system of the rocks, the classification of the formations has been subject to continual modifications; and many conventional or partial terms of distinction have been adopted, some of which still continue in common use, though not always strictly definitive. Thus, the rocks are frequently spoken of as either stratified or unstratified, the former being understood to comprise all those formations plainly due to sedimentary deposition, and the latter the granites and crystalline rocks, which present no distinct lines of stratification, but on the contrary forms and structures that imply the operation of other agents than those which produced the other class of rocks. The distinction is an excellent one, inasmuch as the names are simply descriptive and entirely free from any implication of relative age or position or mode of origin; but it is imperfect, as the crystalline rocks sometimes appear to be

stratified, and the lowest stratified formations lose their distinctive features as they assume in the class sometimes called metamorphic the forms and crystalline structure of the unstratified rocks. The term primary, much in use for the granitic rocks, is objectionable, as it implies priority of time in their production; and these rocks, as is abundantly proved, have in many instances assumed the position and structure in which they are found long after the deposition of some of the sedimentary rocks that repose upon the flanks of their mountain masses. Those of Mont Blanc and of part of the central axis of the Alps even invade strata of the tertiary epoch. (See ALPS.) The name igneous is also an objectionable designation, as it assumes a questionable theoretical origin, at least for many of the rocks that have been thus classed; and moreover, it must either admit the products of modern volcanoes into the same

group, or exclude them from a designation to which they are eminently entitled by assigning them to the special group termed volcanic. To avoid this, the theoretical term hypogene (Gr. *ὑπο*, under, and *γεννᾶω*, to produce, to bear) has been applied to the class, which implies that the rocks included in it were produced in the interior; and Lyell has with the same idea given them the name Plutonic. But distinctions based on such principles have not been generally accepted, and in their place the great divisions most likely to remain are those founded upon the presence or absence of organic remains, and upon the peculiar character of these when present. Thus the term azoic (devoid of vestiges of animated nature) is a comprehensive designation, applicable to all the non-fossiliferous rocks. Hypozoic of Mr. John Phillips may be preferred to it, as introducing a distinction between the ancient non-fossiliferous rocks and the modern volcanic productions. Palæozoic (Gr. *παλαιος*, ancient, and *ζωον*, an organic being) is applied to the formations which rest upon the azoic, and are distinguished by containing vestiges of the most ancient organic forms. It extends upward, including the coal formation and the overlying permian or magnesian limestone group. The designation metamorphic group, which is retained by many geologists (not, however, as a distinct class), comprises a series of micaceous, talcose, hornblende, and clay slates, crystalline limestones, and quartz rocks, which appear to be the lower members of the palæozoic series changed by some cause so as to assume a structure more or less crystalline, and lose all trace of the fossils they once contained. In several instances fossils peculiar to the lower palæozoic rocks have been found in them, but the identity of the formations was generally considered as established before this collateral proof was discovered. The cause of the metamorphism has until within a few years been attributed to the action of intense heat induced by proximity to the mountain masses of the so called igneous rocks when these were in a state of fusion. Not only, however, is this questioned by some of the most distinguished geologists and chemists, but even the igneous nature of the granitic rocks is disputed; and chemical action of saline solutions, aided it may be by moderate degrees of temperature, is referred to as a sufficient and more probable agent in the production of the crystalline rocks and in metamorphosing the stratified. The German chemist and geologist Gustav Bischof is the most zealous advocate of this view, and indeed carries it so far, that we are brought back to the time of Werner and the production of all rocks, except the modern volcanic, by precipitation from solvent fluids. Similar views are entertained by Profs. J. D. Dana, James Hall, and T. Sterry Hunt; and they are so ably supported by appeals to the solvent powers of fluids, and the chemical compositions of the various rocks and their constituent minerals, that the opinions of geol-

ogists will unquestionably be materially modified respecting the previous condition of many of the crystalline rocks. Bischof's great work presents the most complete exposition of these views. It is entitled *Lehrbuch der chemischen und physikalischen Geologie* (Bonn, 1854), and has been translated into English by Benjamin H. Paul. The subject may also be studied in Delesse's papers in the *Annales des mines*, in Dana's "Mineralogy," vol. i. p. 226 (4th ed. 1854), in the reports of the Canadian geological survey, and in Leasley's "Iron Manufacturer's Guide" (New York, 1859), p. 861 and elsewhere. For the next great division above the palæozoic, and including as its uppermost member the cretaceous formation, the name mesozoic (Gr. *μεσος*, middle) has been proposed by Mr. Phillips, the English geologist, and cainozoic (Gr. *καινος*, recent), for the tertiary formations; and these terms are now used to some extent as synonymous respectively with secondary and tertiary. These last names, however, are by no means given up, and to complete the series the term primary is removed by M. Boué from its former inappropriate place, and applied to the palæozoic class; an arrangement approved by Lyell, who to prevent confusion sometimes adds to it the epithet fossiliferous. Confusion, however, may also occur from another source, for the fossiliferous rocks from the base of the series to the chalk having originally all been classed as secondary, it is still common to speak of those below and including the coal measures as the lower secondary, and of those above including the chalk as the upper secondary—a convenient distinction, originally applied, we believe, by Prof. H. D. Rogers. The formations belonging to the present epoch are sometimes classed as quaternary, recent, post-tertiary, or post-pliocene. The subdivisions of the several classes have been established by the investigations of different geologists in different countries, and those adopted by the English geologists are recognized in the United States. The new subdivisions required in our own groups are in the palæozoic series, and in adding below them two other groups determined by the Canadian geologists. The upper of these is called the Huronian, the lower the Laurentian. The conglomerates and limestones of these ancient formations both testify to an origin derived from preëxisting formations. Thus the products of sedimentary deposition are carried back far into the domain where until of late Pluto held undisputed sway. Certain obscure quasi-coraline forms discovered in the Laurentian rocks, together with phosphate of lime, a mineral often of animal origin, and the recent discovery of fossils in gneiss in North Carolina, point even to the possibility that these most ancient groups of stratified rocks may finally come to be added to the palæozoic class.—The following abridged scheme presents the most important divisions in the order of arrangement of the formations from the recent to the most ancient, as now generally recognized:

Class.	Group.	European divisions.	Examples and localities of American equivalents.	
TERTIARY or CAINOZOIC.	POST-TERTIARY.	Alluvium. Post-pliocene.	Modern deposits of rivers and lakes; peat beds, &c. Delta of the Mississippi, &c. Bluffs of the Mississippi; loess.	
	PLIO-GENE.	Newer pliocene, or pleistocene. Diluvium. Older pliocene.	Boulder-drift formation; sands and clays of Lake Champlain and the St. Lawrence river; valley of middle California, auriferous beds. Eastern Virginia and North Carolina.	
	MIO-GENE.	Miocene.	Martha's Vineyard, Long Island, New Jersey, sands and clays of Richmond, Va., and near the coast line of North Carolina, South Carolina, and Georgia, Kansas, Nebraska, California.	
	Eocene.	Eocene.	New Jersey, S. of the Potomac, near the coast, to Texas; Central Georgia; Claiborne beds, Alabama; southern California, Pacific slope.	
SECONDARY or MENOZOIC.	CRETACEOUS.	Maastricht beds. Upper white chalk. Lower white chalk. Upper greensand. Gault. Lower greensand. Wealden.	The group is largely developed in New Jersey, Georgia, Alabama, Mississippi, Arkansas, Texas, New Mexico, and the high plains E. of the Rocky mountains. The fossils generally refer the divisions to the upper part of the group; but in western Iowa, Kansas, and Nebraska, to the lower. It furnishes many calcareous beds, but no genuine chalk.	
	JURASSIC.	Purbeck beds. Portland stone. Kimmeridge clay. Coral rag. Oxford clay. Great or Bath oolite.  Inferior oolite.....  Lias.	Black hills, E. slope Rocky mountains. Connecticut river sandstone, the "middle secondary red sandstones" of New Jersey, Pennsylvania, and Virginia. Coal fields near Richmond, Va., and North Carolina.	
	TRIAS.	Upper, middle, and lower.		
	PERMIAN.	Permian, or magnesian limestone.	South-eastern Illinois, Iowa, N. E. Kansas; &c.	Rogers's series.
PRIMARY FOSSILIFEROUS, or PALÆOZOIC.	CARBONIFEROUS.	Coal measures. Millstone grit, or conglomerate. Carboniferous limestone.	The anthracite and bituminous coal fields, excepting those of Richmond, Va., and North Carolina. The floor of the eastern coal measures. Subcarboniferous limestone and red shales.	Seral. XII. Umbrial. XI.
	DEVONIAN.	Upper.  Middle.  Lower.	{ Gray sandstone. } Catskill group. { Red sandstone. } Chemung group. Portage group. { Hamilton group. } Genesee shale. Moscow shale. Marcellus shale. { Corniferous limestone. } { Schoharie grit. } { Onondaga grit. } { Oriskany sandstone. }	{ Vespertine. X. } { Pomet. IX. } { Vergent. } { Cadent. } { Post-Meridian. } VIII. Meridian. VII.
	SILURIAN.	Upper.  Wenlock.	{ Upper pentamerus limestone. } { Ekerinal limestone. } { Delthyris shaly limestone. } { Lower pentamerus limestone. } { Stromatopora limestone. } { Tentaculite limestone. } Onondaga salt group. { Niagara limestone. } { Niagara shale. }	{ Pre-Meridian. } { Scalent. } VI.
		Middle. Upper Llandovery. Lower Llandovery.	Clinton group. Medina sandstone. Onondaga conglomerate.	Surgent. V. Levant. IV.
		Lower. Caradoc or Bala beds. Same and Llandovery flags. Maclure beds of N. W. of Scotland. Lingule flags.	{ Hudson river slates. } { Utica slate. } { Trenton limestone. } { Black river limestone. } { Bird's eye limestone. } { Chazy limestone. } { Calcareous sand rock. } { Potsdam sandstone. }	Matinal. III.  II.  Primal. I.
	AZOIC.	Oldest gneiss of Scotland.	Huronian. Laurentian.	

The mesozoic division is most largely developed in Europe, and the names are of English formations. The palæozoic groups, though distinguished by names of British origin, are found in the United States and Canada much more fully developed, so that there are many divisions of them not recognized in Europe. The American arrangement is chiefly that of the New York geologists; the equivalent names and numbers of Prof. Rogers are also introduced in a separate column. Different sections of a vast area like the United States will necessarily have local arrangements of these formations, differing from any standard that can be proposed. Thus, by reference to the article LEAD, it will be seen that the lower and middle silurian assume different features in Iowa and Missouri from those of the same group in New York. The first, however, having been studied and determined, will continue to be referred to as the best known system. For more particular accounts of the formations the reader is referred to their names as alphabetically arranged in other portions of this work. In this arrangement no place is found for the granites, sienites, porphyries, and other crystalline rocks, formerly regarded as constituting the floor upon which the stratified rocks are built up, as well as introduced among the strata of different periods. They are no longer placed at the base of the formations, for the reason that their subjacent position is no longer admitted; and it is not now believed that deep borings wherever made must terminate in this class of rocks. Consequently, like the volcanic rocks they cannot appear in an arrangement based on the order of production, as to time, of the formations.—New divisions in the classification of the stratified rocks may be established on different grounds, as by a marked difference in the fossils of contiguous groups and a change in their mineralogical structure, accompanied with a want of conformity in the stratification; as when the layers of the upper group, approaching a horizontal position in their arrangement, repose upon the upturned edges of the lower. Between the production of these two groups there must have been an interval of time longer or shorter, separating the date of the one from that of the other; a period which elsewhere may be represented by long series of formations. Such instances are of frequent occurrence. The three great divisions of the fossiliferous rocks are distinguished, each by its peculiar collection of organic remains, indicating as many complete renovations of the animal kingdom in the history of the globe. The palæozoic contain few if any species in common with the mesozoic, nor these formations with the caenozoic. The last in its oldest groups presents an entirely different fauna from that of the newest cretaceous, and in them first appear living species of shells in small proportion with the extinct, but marking the dawn, the *æra*, of the present order of animal life; whence Lyell's division of eocene for these strata, and the two subsequent divisions of miocene and pliocene, the lower of these

presenting a less, and the upper a greater proportion of recent than of extinct species of shells. But, as remarked by Prof. James Hall, these strong lines of demarcation disappear as absent members are discovered in new localities; and as the sequence is thus made complete the changes in the fauna lose their abruptness. The line between the cretaceous and tertiary, he adds, is most difficult to draw by fossils.—The thickness of the formations is an element of no consideration in their arrangement. It must necessarily vary for the same group with the locality in consequence of the lenticular form essential to the strata; and again, some formations may have been the product of short periods of time and of slowly acting causes of accumulation of their strata, while others continued to be produced during long periods by rapidly acting agencies. But thickness is of special interest in tracing the distribution of formations over wide areas, and thus determining the direction whence came their materials, and that toward which the formation thins away.—It is often a matter of inquiry how strata, many of which are evidently of a superficial nature, can be collected in piles amounting to several miles in thickness; and how such an extent of vertical accumulations can ever be known and measured. Coal beds are understood to have been deposited, each one originally at the surface, yet they are repeated at intervals of variable distances apart amid parallel layers of sandstones, shales, and limestones, either one of which may occupy from a few feet to 100 or more in its recurrence. Sandstones like those of the Connecticut valley, containing tracks of land animals, are found in beds of several hundred feet in thickness, each layer of which must have been at the level of the tide when it received the tracks, which were soon covered by the accumulating sands. The only explanation for such phenomena must be that the surface was gradually subsiding during the periods of these accumulations. The times of slow subsidence were represented by the gathering of the fine sediments or the growth of the coal plants; and those of rapid subsidence by the inflow of the coarse sand and pebbles, which now form the beds of sandstone and conglomerates. Thus the strata continued to be piled upon each other so long as the same system of operations lasted; and thus it was that the palæozoic rocks which constitute the Appalachian system reached the aggregate thickness in some portions of their range of not less than 85,000 feet. When uplifted to form the hills and valleys of a continent, their horizontal arrangement is disturbed, the strata are turned upward so as to present disrupted ends and edges, and by their sloping and undulating position each in its turn is brought to the surface, and all may be measured, some in one locality, and some in others. Subsequently to this uplifting, denuding forces have been in action, removing immense portions, chiefly of the most elevated masses, and building up in more recent seas newer formations from the

wreck of the old in the same manner that these had been produced. Thus after a systematic plan, and with evident provision for the future wants of man, the various useful materials of all the strata are brought within his reach.—The successive introduction and distribution of organic beings is perhaps the most interesting subject developed by geological research; but in this article little more space can be devoted to it than to present the order in which the principal groups appeared. The most ancient forms of animal life found in the lowest fossiliferous rocks are a few mollusca, crustacea, annelida, and zoophytes; the mollusca represented by *lingula* and *obolus*; the crustacea by trilobites; the annelida by *scolithus*; and the zoophytes by graptolites, and 2 species named by Prof. Forbes *Oldhamia*, found in the slates referred to the Cambrian group on the coast of Ireland, opposite Anglesea. Of plants the only representatives are fucoïds. Fishes, not with bony skeletons, but of cartilaginous structure, first appear in the upper members of the silurian. Some land plants are also met with in the same group. Orinoidea and corals have become very abundant, and marine mollusca of almost every order. In the United States and other parts of the world similar groups of fossils characterize the silurian. Fishes with bony skeletons, true vertebrata, first appear in the coralline formation of the upper Helderberg; in these, land plants too are first met with. In the Catskill group are found genera of fishes peculiar to the old red sandstone, the upper devonian of England. This formation in Great Britain presents the first reptiles, and these are of lacertian character; in it are also found coniferous plants of the same genera with some afterward met with in the carboniferous group. The organic remains, and especially the fishes of the devonian, the first true vertebrate forms of animal life, are ably described in the works of Hugh Miller. These works give a permanency to the name of old red sandstone, which is little descriptive of the contemporaneous formation of the more slaty and calcareous strata in the county of Devon and other regions, where the group is more extensively developed than in Scotland and the north of England. In the United States, tracks of reptiles are first met with in the sub-carboniferous red shales. (See Fossil Footprints.) The carboniferous group is distinguished for the multitude and size of its terrestrial plants, a wonderfully luxuriant flora, and altogether peculiar to this era. Prof. Göppert has distinguished 934 species of plants, divided as follows: *cellulares*, including the fungi, algae, &c., 19; *vasculares*, 915, of which 772 are cryptogamous plants, or ferns, calamites, and asterophyllites, and 94 are phanerogamous plants, as cycada, conifera, &c. Insects are detected with these, as extinct species of beetles, crickets, cockroaches, &c. The vestiges of marine mollusca, corals, and fishes, preserved in the sandstones, shales, and limestones of this group, indicate the existence of broad

archipelagos, subject to frequently varying relations between the areas above and below the level of the waters. Reptiles are found related to the batrachians on the one hand and to the so called sauroid fishes on the other. The trilobites, which from the silurian have gradually lessened in number as compared with other fossils, disappear, and their place is supplied by the kindred genus *limulus* or king crab, a family still represented in our own seas. About 1,050 species of this group have already been described. The vegetable and animal remains of the permian group strongly resemble their congeners of the carboniferous epoch, and some species are common to both formations. The cephalopoda, represented in the coal measures by 160 species, appear in the permian group only in a single nautilus. The reptiles are mostly of a higher order than the more ancient forms. Some are thecodont saurians, one species allied to the living monitor. With the permian all the ancient species of animals disappeared, and the fauna of the trias which succeeds is represented by entirely new forms. This is more particularly a German group, and receives its name from its triple division of *Keuper*, *Muschelkalk*, and *bunter Sandstein*, the last resting on the permian. It abounds in remains of reptiles and fishes, and contains tracks of gigantic batrachians. In its uppermost portion have been found in Wurtemberg the earliest vestiges of mammalia, molar teeth of a solitary small marsupial, named by Plieninger, its discoverer, *microlestes antiquus*. Prof. Emmons has also discovered in the Chatham coal fields of North Carolina, in strata probably of the epoch of the keuper, the jaws of another minute mammal, which he calls *dromotherium syleestra*. In Frome, Somersetshire, teeth of marsupial mammals have very recently been found in strata supposed to be of the same age with the German keuper, and one closely resembles the mammal relic of the Wurtemberg locality. These occurrences are the more remarkable, as no other mammal remains are found till near the base of the cretaceous formation, with the exception of two species of marsupials in the English oolite. The red sandstones of the United States referred to the period of the upper trias or lower jurassic have afforded few fossils, but some of them are exceedingly interesting. These are the footprints of birds and reptiles already referred to, the former being the earliest vestiges of the high class of animals to which they belong. Beside these, the formation affords some plants, mostly terrestrial, a few shells, crustacea, thecodont saurians, and several fishes, most of them of the genus *catopteris*. The coal formations of S. E. Virginia and of North Carolina, on about the same geological horizon as the red sandstone, present a flora distinct specifically, and in part generically, from that of the true carboniferous epoch. The most abundant forms are gigantic zamites and equisetums. The stigmaria, sigillaria, and lepidodendra have entirely disappeared. Several species, as the *equisetum*



*columnare* and others, are found in the oolitic sandstones of Whitby in Yorkshire. Some saurian teeth are met with, and relics of fishes. The shaly beds also contain numerous delicate shells, called *posidonomia*, which may perhaps have belonged to the crustacean genus *estheria*. The jurassic group is of interest for the increasing variety of organic relics it presents. Its deposits afford evidence of estuaries and of tides, and in England of alternations of fresh water with salt and brackish waters. New and various forms of animal life appear, from the huge saurians to minute insects, the wing cases and other relics of the latter being sometimes so abundant as to give a peculiar character to the calcareous strata in which they are found, and cause some of these to be distinguished by the name "insect limestone." The reptiles are strange forms of *ichthyosauri*, or fish lizards, some more than 24 feet in length, and *plesiosauri*, 11 feet long, animals fitted for living in the sea, and yet for breathing air like the cetacea. Pterodactyles, or flying lizards, tortoises, crocodiles, and other reptiles, appear in this group. In the Stonesfield slate of the Bath oolite several specimens of jaws have been found, which are referred to 2 varieties of mammifera, the one named *phacolotherium* belonging to the marsupials, and the other, called *amphitherium*, representing the placental insectivora; another species of the placental mammalia, named *opalotherium*, has also been found in the middle Purbeck beds of the same group. A remarkable distinction is observed by Brongniart in the flora of the several divisions of the stratified rocks. The period of the primary fossiliferous he styles "the age of acrogens;" that of the secondary up to the cretaceous "the age of gymnogens;" and that of the cretaceous and tertiary "the age of angiosperms." In the lower cretaceous members leaves of dicotyledonous angiosperms are met with among the coniferæ and cycadaceæ, and their proportion increases in the newer strata as the gymnogens diminish. In the wealden are found teeth and bones of terrestrial reptiles of extraordinary size and character. The iguanodon is supposed to have attained a length of 50 to 60 feet, and its teeth indicate herbivorous habits, and are worn by mastication like the teeth of herbivorous mammals. The shells of the wealden of Kent, Sussex, and Surrey are fresh water, referring the formation to fluvial origin. The fossils of the cretaceous formation above the wealden are almost wholly of marine character. The chalk and other calcareous rocks belonging to it, like the coralline structures of modern seas, abound in shells and zoophytes of great variety, and teeth of sharks and other fishes. Relics of turtles, saurians, and pterodactyles also occur in it. Lyell found 5 out of 60 New Jersey cretaceous shells identical with European species of the formation. These were *ostrea larva*, *O. vesicularis*, *gryphea costata*, *pecten quinque-costatus*, and *belemnites mucronatus*. In both countries these species

have a great vertical range, and might therefore be expected more than any others to be found in distant parts of the globe. Still a remarkable similarity is found in the general character of the group of fossils of the formation in the two continents. More than 10 European species have been found among less than 100 forms from the cretaceous strata of Texas. In the lower tertiary we first meet with a few testacea which we recognize as living; and the number of recent species, as before remarked, gradually increases with the later members of the formation. The lowest division, the eocene, is distinguished in the Paris basin for the great variety of its organic remains, among which are found productions of the sea alternating with those of fresh water and of the land. Skeletons of birds and of quadrupeds are preserved in wonderful perfection in the beds of gypsum which are quarried for the manufacture of plaster of Paris. Of 50 species of quadrupeds, nearly  $\frac{2}{3}$  are pachydermata; one species of dog, a weasel, a squirrel, an opossum, and a bat, have also been recognized. All these species, however, as well as those of the birds, fishes, and reptiles, are extinct. The eocene beds of the United States east of the Mississippi abound in marine fossils alone, and though no terrestrial mammalia or land quadrupeds have been found in them, vestiges of cetacean mammalia are not rare. In Clarke co., Ala., the colossal bones of the zenglodon are a common feature in the calcareous strata of this formation. Lyell speaks of the vertebral column of one skeleton more than 70 feet in length at one locality which he visited, and of another 50 feet long. From the collections made at Claiborne more than 400 species of marine shells, echinoderms, and fishes have been determined, but only 8 or 10 of these are recognized as European. In the miocene deposits, which succeed, the number of recent species of shells is less than of the extinct; but a decided approach is perceived in the fauna toward the modern types. In France, to the south of Tours, are found in the faluns referred to this formation remains of mastodons and of extinct species of the horse, hippopotamus, rhinoceros, deer, and of the cetacea, as the morse, sea-calf, lamantine, and dolphin. The miocene beds of the southern Atlantic states, regarded as nearly equivalent to the faluns of Touraine, have furnished about 200 species, comprising mollusca, crustacea, corals, several fishes and reptiles, and one or two cetacea; about 20 per cent. of the shells and corals belong to recent species. In Nebraska the strata of this period, which have also been regarded as belonging to the upper eocene, have afforded bones of a number of extinct ruminant and other quadrupeds, which have been described by Dr. Leidy of Philadelphia. The deposits were of fresh water character, furnishing several fresh water shells and a fresh water crustacean. Far up the Missouri river, near the Yellowstone, similar deposits are known, and in these have been found land and fresh water shells, a few of marine

character; also remains of plants, saurians, turtles, &c. It is remarked that the eocene and miocene of the Atlantic states contain in all their numerous organic remains only about 2 or 3 species to the hundred in common; a fact indicative of the lapse of a considerable period between the completion of the one and the commencement of the other, during which no strata were deposited in that region. With the progress to later members of the tertiary, the similarity of the animal vestiges, especially of the testacea, to living forms rapidly increases. Of the larger land quadrupeds the species and many of the genera even, as of the mastodon, were lost before the present epoch. In some of the comparatively modern beds of this group found in Georgia between the Altamaha and Turtle rivers, containing shells of the same species with those inhabiting the neighboring waters, are found remains of the extinct species of the horse, hippopotamus, bison, elephant, mastodon, megatherium, and mylodon. Remains of the same elephant and mastodon are also found in New Jersey and New York beneath the beds of peat lying in the upper portion of the pleistocene drift. The genera of fossil shells peculiar to the principal geological divisions are thus given by Woodward in his "Manual of the Mollusca." Some of the genera named have a wider range, but are found most abundant in the division with which they are included in the table. Such is the case with the belemnites. The names in italics are of existing genera.

Divisions.	Genera and Subgenera.
PLIOCENE.	<i>Argonauta, Strombus, purpura, trophon, Yoldia, tridacna, Oliva, verticordia.</i>
MIOCENE.	<i>Spirulirostra, sturlia, vaginella, ferrussina, Halla, proto, Deshayesi, nio, caesidaria, Carolina, Grateloupia, artemis, lapei, Jouannetia.</i>
Eocene.	<i>Beloptera, lychnus, megaspira, Glandina, typhis, eoluthites, clavella, pseudoliva, scapha, rimella, conorbis, strepsidura, globulus, phorus, velates, chiloconcha, volvaria, lithocardium, terebina.</i>
UPPER CRETACEOUS.	<i>Belemnites, conoteuthis, turritites, pyrochoceras, hamites, scaphites, pterodontia, dinulla, tylostoma, Acteonella, globiconcha, trigonosemus, magas, lyra, Neithes, inoceramus, hippurites, caprina, caprotina.</i>
LOWER CRETACEOUS.	<i>Crioceras, toxoceras, hamulina, baculina, regulensis, caprinella, sphaera, thetia.</i>
UPPER JURASSIC.	<i>Cocconeuthis, acanthoteuthis, leptoteuthis, nautilus, spinigera, purpurina, nerinea, neritoma, pteroperna, trichites, hypotrema, diceras, trigona, jachysima, Bowerbia, Tancredia.</i>
LOWER JURASSIC.	<i>Belemnites, beloteuthis, geoteuthis, ammonites, alaria, trochetoma, rimula, pleolina, cylindrites, Waldheimia, thecidium, spirifer, ceromya, gryphae, hippopodium, cardina, myoconcha.</i>
TRIAS.	<i>Cerasites, naticella, platystoma, Koninkia, cyrtis, monotis, myophoria, pleurophorus, opia.</i>
PERMIAN.	<i>Camaphoria, sulcosteges, strophalosia, myalina, Bakewellia, axinus, Edmondia.</i>
CARBONIFEROUS.	<i>Nautiloceras, discites, goniatites, Porocella, naticopsis, platyschisma, metoptoma, producta, avicula-pecten, anthracocela, conocardium, Sedgwickia.</i>
DEVONIAN.	<i>Bactrites, gyroceras, clymenia, apicoceras, serpularia, spirifera, unclites, merista, Davidsonia, calocela, stringocephalus, megalodon, orthonota, pterinea.</i>

SILURIAN. { *Actinoceras, phragmoceras, trochoceras, asco-ceras, theca, holopella, Murehisonia, atrypa, Retzia, cardiola, clidophorus, grammysia, gonolophorus.*

CAMBRIAN. { *Camarcoceras, endoceras, gonloceras, pterotheca, Maclurea, raphistoma, holopea, platyceras, ortholina, platystrophia, porambonites, pseudo-crania, ambonychia, modiolopsis, lyrodesma.*

By turning back to the groups of strata and the vestiges of organic beings which they successively introduce, one cannot fail to perceive a marked progress in the condition of the surface of the earth, adapting it for higher organizations of animal life, and at the same time the appearance of these forms, as it seems by successive acts of creation. The broad seas of the lower silurian epoch, stretching over large portions of the globe, contain their peculiar types of marine life, crustacea, cephalopoda, and algae, all perfect of their kind, and as admirably constructed as their representatives found in modern seas. To these invertebrata next appeared in the deposits left by the waters of the devonian period the first vertebrate animals in the form of fishes. Aquatic reptiles succeed; and when in the luxuriant vegetation of the carboniferous epoch land appears, it is productive only of those forms of animals adapted to moist tropical districts scarcely elevated above the sea level. No vestiges of mammalia or of birds yet appear. The reptiles first attain their highest development in the lias and the oolite periods; and at last in the tertiary epoch, distinguished for its broad areas of dry land, the mammalia are found in numbers and variety which continually increase up to the introduction of their highest representative, man. This general scheme of the creation is established by most careful geological investigations conducted in various parts of the world. New discoveries may somewhat modify its minor features, but where uniformity in the operations of nature is found to obtain so generally, and no exception is detected, it is unphilosophical to refuse to accept the evidence because the whole has not yet been submitted to our examination.—In what manner new species have been introduced is a question that has occupied the closest study of many philosophers, but which remains in the same obscurity as the origin of individual life. Some, adopting the views of Geoffroy St. Hilaire, contend that the ancient species were the progenitors of all that succeeded and that now live. This view was supported by De Lamarck, and ingeniously sustained by the authors of the "Vestiges of Creation." But the arguments adduced to support the doctrine of the so called transmutation of species, which if established destroys the real existence of species in nature, were based on assumed facts, or carried out to an extent unwarranted by any of those within our experience. The changes of form to which species are subject in successive generations by change of circumstances are very limited, and appear to be restrained within certain bounds by constant laws. No instance has ever been established of one species being succeeded after many

generations by another even of the same genus or family; in the immense collections of fossil remains which have been most carefully studied no evidence of a passage of this character has been proved. On the other hand, instances are everywhere encountered in which new types of life appear, not through any gradation, but so far as we can judge by a sudden step, the strange being having none of its genus, order, or even class to point back to as its possible progenitor. Moreover, the fossil remains present no evidence of a progress in the succession of species to those of higher organization leading to higher types of life. On the large scale a progress to higher orders is perceived, as already observed; but the earliest silurian trilobite exhibited in the structure of that most delicate organ, the eye, the same complexity and wonderful perfection that is perceived in the eye of the fly and butterfly of the present day, and which is perhaps unequalled in living crustacea; while the fishes possessed as perfect an organization as that belonging to any of the later members of the same families.—In the sketch thus far presented of the development of geological science no special attempt has been made to distinguish between the subjects relating to descriptive and those belonging to the department of physical geology. As the phenomena introduced suggested the causes of their production, these have been incidentally considered, and thus it is that some of the grandest subjects of physical geology, especially those of a speculative nature, have escaped notice. In both departments important omissions must be observed, which in part at least may be attributed to the necessary limits imposed upon the present article, and to the treatment of their subjects under separate heads. Thus the phenomena of some of the mighty forces which disturb the arrangement and modify the structure of the strata are partially treated in the articles *CENTRAL HEAT, EARTHQUAKE, ETNA, and VOLCANO*; of those which distributed some of the comparatively recent deposits, in *ALLUVIUM, DILUVIUM, and GLACIER*; and the mode of production of many calcareous beds is explained in *ATOLL, and CORAL*. The subject of *MINERAL VEINS* is treated under its own head, as also in the articles *COPPER, GOLD, IRON, LEAD, &c.* But for a satisfactory elucidation of these and other topics reference must be made to works specially devoted to their treatment. In Lyell's "Principles of Geology" may be most profitably studied the subject of geological dynamics. The work is expressly an attempt to explain the former changes of the earth's surface by the operation of causes now in action, and consequently comprehends a minute investigation of the changes taking place both in inorganic and organic nature. The movements going on upon the surface and coming under the observation of man are considered sufficient, if extended through indefinite periods of time, to account for all the phenomena presented in the strata of the earth, without the necessity of attributing to the forces any greater intensity of action than they

now exhibit. It is shown that even the climate of any part of the world may be materially modified by the varying conditions of portions of its surface, whether covered by water or raised high above the ocean's level. The existence of elevated continents in polar latitudes, and at the same time of seas spreading over the equatorial regions, would necessarily produce a cold climate over large portions of the earth; while, the conditions being reversed, a tropical climate might reach into high latitudes, and plants of kindred character to those that make up the ancient coal beds might again thrive where the forest remains of the carboniferous epoch now lie buried beneath perpetual snow. It is not perhaps extravagant to suppose that such conditions of the surface may in former times have obtained; for the rocks themselves testify, in the marine fossils they contain, that almost all parts of the earth's surface have been beneath the level of the sea; and changes of level, similar to those which have been observed by man, either suddenly taking place, as in the rising at different times of the coast of Chili, or by a constant imperceptible motion like that which has continued for centuries to raise the coast of Sweden, and that again which in like manner carries down the coast of Greenland—such as these, if continued during the long geological periods, would suffice to produce the required conditions. The geological formations in the phenomena of their deposition demand these periods, perhaps fully as long as could be required on the supposition that no other and no more energetic causes than those now in action had influenced their production. But those who oppose this theory maintain, that although periods of time of illimitable duration must be admitted, it is unphilosophical to make the intensity of the forces in action, as observed in the short period of man's existence, a measure of the intensity of the same forces in all past epochs. In particular the elevation of mountain chains, it seems to many, must have exhibited more energetic action than has ever been displayed in the experience of man. Several so called theories of elevation have been applied to explain these phenomena. Von Buch and Élie de Beaumont regarded many mountain masses as "craters of elevation," produced by the expansive force of elastic vapors beneath, lifting up and breaking open the horizontal strata, and leaving them arranged in conical form, or sloping on each side from a central line. Thus Etna and Vesuvius, they contended, were lifted up by a single movement; and the same force of elastic vapors might in like manner have been the agent which suddenly uplifted the mountain chains. (See *ÉLIE DE BEAUMONT*.) These views are opposed by many serious objections. The theory of the professors Rogers is referred to in the article *EARTHQUAKE*.—The views of Prof. James Hall upon this subject have not been before published. They are the result of extended observations, continued for many years, of the strata in their most dis-

turbed condition in their eastern belt, and of the same formations in the western states, where they lie nearly horizontally, and are filled with organic remains. Toward the west the thickness of the sedimentary deposits is known to gradually decrease; over the great western plateau there is no evidence in the formations of metamorphic action, and trap dikes are of very rare occurrence. Approaching the Appalachian range, the strata become more variously folded and contorted, and the structure of the rocks more compact, in some instances crystalline, and their cleavage more irregular. The introduction of crystalline minerals, and a thicker bedding of the limestones, also bear evidence of progressive metamorphism, which as traced eastward is accompanied by a more broken topography, and ridges and valleys of more marked outlines, corresponding in direction to the synclinal and anticlinal axes. Neither in New England, from the sections across this portion of the range made by Prof. Hall in 1843 and 1844, nor in Pennsylvania and Virginia, according to the observations of other geologists, is there an appearance of any great central axis of older date than the rest, or of igneous rock, theoretically regarded as the necessary nucleus of a mountain chain. On the contrary, many of the highest ridges are composed of strata lying in synclinal axes, the newest, and not the oldest, forming the summits. Seeing that these phenomena could not be explained by reference to any central axis or other theory of elevation, Prof. Hall was led to adopt entirely new views of the origin of mountain chains, after submitting the results of his own widely extended observations and those of others to careful study. The strata uniformly increasing in thickness toward the mountain ranges was an effect evidently not due to their folding. The Appalachian chain, composed of paleozoic strata, coinciding in direction with the original line of greatest accumulation of deposits of that period, the currents which produced them must have had the same direction; and on each side the sediments must have gradually thinned away in finer materials. The anticlinal and synclinal axes having also this same general direction, and the action of metamorphism traceable along the same lines increasing with the increasing thickness of the rocks, and with the frequency of the plications of the strata, Mr. Hall infers that the mountain ranges result from the original accumulation of sediments, their height depending on the quantity of this original deposit, and that the elevation of mountains can nowhere be so great as the original thickness of the sediments. By subsequent action their surface has been abraded and their forms modified; but the greatest portion of the mass still lies below the horizon of our observations. This conclusion is quite true respecting the Appalachian chain, where the sedimentary deposits present a thickness varying from 80,000 to 50,000 feet, while the summits range only from 4,000 to 6,000

feet in height. The same views, sustained by a large accumulation of facts, he applies to the Rocky mountain range, where the sediments of later periods increase the elevation, and the same principles are believed by the author of the theory to be applicable to all mountain ranges, the elevations being dependent on the amount of original accumulation of sediments; where these deposits consist of the aggregate of several geological periods, all the higher will be the mountain chains. The mountains of the northern United States and Canada, capped by rocks of the Laurentian age, never reach the elevation of those of the Appalachian, composed of the paleozoic formations; and the height of these is surpassed by the summits of the central and western portions of the continent, capped by strata of still later age. In the Alps and other ranges of great elevation the summits are sometimes composed of still more modern formations. These views would restore to some extent the opinions of the older geologists, who always regarded mountain chains as part of the continental elevation. The hitherto unexplained feature of the plication of the strata in numerous nearly parallel axes are accounted for by Mr. Hall thus. It is well understood that the ocean of these ancient deposits must have been always shallow, notwithstanding the immense thickness they attained; and that its bed must have been more or less continually subsiding. This movement would involve a lateral pressure, which would result either in ruptures below or a sliding upon each other of the middle strata, or else cause the upper portions of the mass to become folded in lines parallel to the line of subsidence, which would be the original line of accumulation. The same cause that raised the more elevated portions uplifted the thinner and less disturbed deposits, the whole being a continuous elevation. The present Gulf stream of the Atlantic and other great oceanic currents are collecting ranges of sediments, which if uplifted with the whole oceanic area would no doubt present features similar to those of existing mountain chains from which the direction and force of the currents might be traced.

GEOMETRY (Gr.  $\gamma\eta$ , the earth, and  $\mu\epsilon\rho\epsilon\sigma\alpha$ , to measure), the science which treats of order and proportion in space. One of the oldest and simplest of sciences, it is nevertheless variously defined, and its fundamental definitions are variously announced, according to the philosophy of the writer. Thus it has been defined, in accordance with the etymology of the word, as the science of measurement, as though it dealt with material things. A portion of space such as might be filled by a solid body is itself called in geometry a solid. The boundaries of this geometrical solid are called surfaces. But geometrical surfaces may be conceived as not bounding solids, but as simply separating space from space. They constitute one form of the zero of space, having length and breadth without thickness; they are a zero of solidity, but have a magnitude of their own, called super-

ficial area. If a surface be limited in extent, the boundary on any side is a line. A line is the 2d form of the zero in space, being zero not only in solidity, but in superficial area, and having a magnitude in length alone. A line may be conceived as not bounding a superficies, but as being simply a fixed zero of the 2d form. If the line be limited in extent, its extremities are points. A point may also be conceived as a zero in space, of the 3d order, a zero not only in solidity and in superficies, but in length also—having no magnitude or proportion, and retaining only order, or position, as the sole element of its existence. In the position of points, the difference in the direction of a first and second point from a third is called an angle, and the natural unit for measuring angles is oppositeness of direction. We have here all the elemental conceptions of geometry, viz.: a point, a line, a surface, a solid, and an angle, that is, order of position; and magnitude, or proportion of distances. From these definitions as data a vast amount of geometrical science may be deduced by the laws of logic; and geometry has by some been regarded as a purely logistic science, which merely develops the truths implied in its definitions. Geometers themselves, however, usually regard these definitions as descriptions of realities independent of matter; to them a sphere is more real than a globe, and their science is daily discovering sublime truths of the relations of space, not implied in these elemental conceptions, but only connected with them by indissoluble ties of mutual relationship.—The history of geometry is divided by Chasles, in his valuable *Aperçu historique des méthodes en géométrie*, into 5 periods. The 1st is that of the Greek geometry, lasting about 1,000 years, and ending about A. D. 550. Then after a pause of 1,000 years, the 2d period began in the revival of ancient geometry about 1550. A 3d period or epoch was marked in the beginning of the 17th century by Descartes' co-ordinates. The 4th period was inaugurated in 1684 by the "sublime invention" of the differential calculus. The 5th era is marked in our own century by Monge's "Descriptive Geometry," by which he developed the idea of reducing problems of solid geometry to problems in a plane. Since Chasles' *Aperçu historique* was published, a 6th period has been introduced by the publication in 1858 of Hamilton's "Quaternions." Greek geometry began, it is said, with Thales and Pythagoras, who obtained their first ideas from the Egyptians and from India. The Pythagorean school demonstrated the incommensurability of the diagonal of a square with its sides, and investigated the 5 regular solids. They had some knowledge of triangles and circles, and possibly were acquainted, as it is affirmed they were, with the fact that the circle and the sphere are the largest figures of the same perimeter or the same surface. About a century after Pythagoras, the great Plato and his disciples commenced a course of rapid and astonishing discoveries,

through the study of the analytic method, conic sections, and geometric loci. The ancient analytic mode consisted in assuming the truth of the theorem to be proved, and then showing that this implied the truth only of those propositions which were already known to be true. In modern days the algebraic method, since it allows the introduction of unknown quantities as data for reasoning, has usurped the name of analytic. Conic sections embrace, as is well known, the study of the curves generated by intersecting a cone by a plane surface. Within 150 years after Plato's time this study had been pushed by Apollonius and others to a degree which has scarcely been surpassed by any subsequent geometer, and his works, embracing his predecessors' discoveries as well as his own, proved 19 centuries afterward the foundation of a new system of astronomy and mathematics. Geometrical loci are lines or surfaces defined by the fact that every point in the line or the surface fulfils one and the same condition of position. The investigation of such loci has been from Plato's day to the present one of the most fruitful of all sources of geometrical knowledge. Just before the time of Apollonius, Euclid introduced into geometry a device of reasoning which was exceedingly useful in cases where neither synthesis (i. e. direct proof) nor the analytic mode is readily applicable; it consists in assuming the contrary of your proposition to be true, and then showing that this implies the truth of what is known to be false. Contemporary with Apollonius was Archimedes (287–212 B. C.), who introduced into geometry the fruitful idea of exhaustion. By calculating circumscribed and inscribed polygons about a curve, and increasing the number of sides until the difference between the external and internal polygons becomes exceedingly small, it is evident that the difference between the curve and either polygon will be less than that between the polygons themselves; and this method may be continued by increasing the number of sides, until the difference between the curve and the polygon is as small as we please. Hipparchus in the 2d century before Christ, and Ptolemy in the 2d century after Christ, applied mathematics to astronomy; at the date of the latter writer the doctrine of both plane and spherical triangles had been well discussed by Theodosius and Menelaus. Vieta (A. D. 1540–1603), to whom we principally owe the invention of algebra, enlarged Plato's analytic method by applying algebra to geometry. To him also is due the merit of discovering the ratio of the increase of angles and the increase of their sizes. Kepler (1571–1630) introduced into geometry the idea of the infinitesimal, thus perfecting the Archimedean exhaustion; and also first made the important remark which leads to the solution of questions of maxima, that when a quantity is at its highest point its rise becomes zero. To Kepler we owe also one of the first examples of a problem of descriptive geometry, in the graphic solution of an eclipse of

the sun. Soon after Kepler, Cavalieri published (1635) his *Geometria Indivisibilibus*, a further step in the road from Archimedes' exhaustions to Newton's fluxions. Roberval gave a method of drawing tangents identical in its philosophy with fluxions. Fermat (who shares with Pascal the credit of inventing the calculus of probabilities) introduced the infinitesimal into algebraical calculation, and applied it with great success to geometrical questions. Pascal, applying his wonderful genius to the conic sections, anticipated some of the latest inventions by his famous theorem concerning the relation of 6 points arbitrarily chosen in a conic section. But most wonderful of all the geometrical inventions of the 17th century was that of Descartes, published in 1637; it consisted simply in considering every line as the locus of a point whose position is determined by a relation between its distances from 2 fixed lines at right angles to each other. The relation between these distances, being expressed in algebraical language, constitutes the equation of the curve. By later geometers this method has been generalized so that the distances may be measured from any fixed point or line, and measured in a straight line or in a given curved line; or instead of some of the distances, directions or angles may be introduced. For a majority of the most important cases, Descartes' coordinates are, however, still the best. Huyghens, whose treatise on the pendulum is ranked by Chasles with Newton's *Principia*, making a glorious combination of Descartes' methods with those of his predecessors, added to geometry the beautiful theory of evolutes, which are the curves formed by the intersection of straight lines at right angles to a given curve; and he applied it not only to the pendulum, but to the theory of optics. Soon after (1686) Tschirnhausen published a wider conception of the generation of curves by straight lines. His famous caustics were made by the intersection of reflected or refracted rays of light; and he proposed other curves made by a pencil point stretching a thread whose ends were fastened, and which also wrapped and unwrapped from given curves. About the same time also De la Hire and Le Poivre invented, independently of each other, modes of transforming one plane curve into another, by making the given curve a peculiar basis for the locus of a new curve. They thus transformed the circle into all the conic sections, without any reference to a cone. The great Newton also invented a means to the same end, so that the consideration of the ellipse and parabola became independent of that of any solid. Thus these methods, especially that of Le Poivre, anticipated descriptive geometry, and perhaps prepared the way for it. In 1700 Parent generalized the method of Descartes from representing a line to representing a curve surface by an equation between the distances of a point in the surface from 3 given planes, at right angles to each other; but this was not methodically arranged, and it was left for Clairaut, in 1781, to finish

this great step. Meanwhile Newton's fluxions and Leibnitz's differential calculus had come into use, and Newton, Maclaurin, and Cotes had made the most exhaustive investigation into curves of the 8d degree, and many fine discoveries in regard to curves in general. The enthusiasm which Newton's example aroused in England and Scotland for pure geometry was followed by a lull of about a century, when Monge by his "Descriptive Geometry" gave the whole study new life. The essence of descriptive geometry lies in the transmutation of figures, the reduction of geometry of 3 dimensions to geometry in a plane. One beautiful example of this branch of science may be found in linear perspective, which simply projects the points of a solid upon a plane, by straight lines of light from the eye. Carnot, at the beginning of this century, in his "Geometry of Position" and "Theory of Transversals," also introduced valuable methods; in the first showing how to indicate the direction of lines more exactly by the use of positive and negative signs, and how to use the idea of motion in a more effective manner than before in geometry; in the second introducing that general form of the theory of transversals, i. e., of the intersections of a system of lines by one not belonging to the system, which Chasles employs so happily in his *Géométrie supérieure* (1852). This writer develops two principles in the correspondence of figures: one, the principle of duality, by which for a given figure a second is found such that points, planes, and straight lines in one correspond to planes, points, and lines in the other; the second, the principle of homography, by which for any figure a second is drawn such that points, planes, and lines in one correspond to points, planes, and lines in the other; the utility of each being to transfer the demonstrations of truth in one figure to the problems of another figure. In our own time many new ideas have been published, which cannot yet be properly appreciated, because their actual fruitfulness has not been tested. Sir William Rowan Hamilton of Dublin, in attempting to develop a science of time, discovered it to be a pure algebra; and pushing his inquiries further, formed an algebraic notation for questions of space, which promises to become the most valuable geometrical engine yet invented. His "Lectures on Quaternions" (1853) develop the mode of using algebraic notations with a geometrical meaning, as follows. A line, perfectly expressed, has direction as well as length. The sum of 2 sides of a triangle is therefore equal to the 3d side; in other words, you arrive at the same point whether you go through 2 sides in succession, or only through the 3d side. Quotient is the expression of ratio, and the ratio of 2 lines if perfectly expressed must give their directions as well as length. The quotient of one side of a triangle divided by another must therefore be a quaternion, that is, embrace 4 numbers, one to express their ratio of length, one their angle with each

other, and 2 to express the position of their plane. The value of these quaternions may be made apparent by a simple case. Suppose 3 lines of equal or unequal length to radiate from a fixed point. Let the quaternion quotients obtained by dividing either of these lines by another be denoted by  $r$ ,  $p$ , and  $q$ . As these express all the relations of the rays, of the 3 extremities, and of the angles made by them when of equal length, it is evident that a single equation between  $r$ ,  $p$ , and  $q$  may express all the theorems both of plane and spherical trigonometry. Prof. Peirce of Cambridge, Mass., in 1858 proposed a general method of expressing curves, which promises to lead into unexplored fields. He defines a curve by an equation between angles which it makes with 2 known curves allowed to vary either in parameter or in some other mode so as to produce an intersection of each other at each point of the 3d curve. Thus, to take a familiar example, the conic sections may be defined by their making equal angles with straight lines radiating from 2 fixed points; and for another, the logarithmic spiral makes with straight lines radiating from a point, and circles concentric round that point, angles whose ratio is constant.—The relation of geometry to other sciences is, like that of the other mathematics, twofold, giving and receiving. To mechanics it gives the only possibility of understanding the laws of motion, and from mechanics it receives the conception of moving points, lines, and surfaces, and thus generating lines, surfaces, and solids. To chemistry it gives the only means of investigating crystallization, polarization, &c., and from chemistry receives new ideas concerning the symmetry of planes. To botany and zoology it gives the laws of form, and from them receives those highest problems of morphology which are as yet barely touched upon by the masters in either of these sciences. In the study of the human spirit, geometry proposes the question of the foundations of belief, by giving the first examples of demonstration; and from the psychological inquiries thus aroused, geometry has received from age to age the new conceptions which have been the base of many new methods of investigation and proof. To theology geometry gives definite conceptions of the order and the wisdom of the natural creation, and *a priori* demonstrations of the optimism of actually existing material laws; and from theology she has been stimulated to many fresh exertions in the investigation of these teleological questions.—The beginner in geometry will find many text books, from which he may select according to his taste. None is perhaps more popular than the "Elements of Geometry and Trigonometry," by Prof. Charles Davies, from the works of A. M. Legendre (New York, 1858). Much more condensed and suggestive is an "Elementary Treatise on Plane and Solid Geometry," by Prof. Benjamin Peirce (Boston, 1858). An easier treatise than either of these, by Prof. G. R. Perkins, has been published in

New York. The true style of Greek geometry may be found in Playfair's "Euclid," of which there is a New York edition. For advanced studies the following list of works is recommended: "Modern Geometry," by Mulcahy (London, 1859), giving some idea of the new methods, but not employing analytical geometry; "Elementary Treatise on Plane and Spherical Trigonometry," and "Elementary Treatise on Curves, Functions, and Forces," by Benjamin Peirce (Boston, 1858), giving in its most condensed form the necessary introductory knowledge of the notation of trigonometry, analytical geometry, and the calculus; "Analytical Geometry," and "Differential and Integral Calculus," by Charles Davies (New York, 1855), giving a more popular expression of the same knowledge; a "Treatise on Conic Sections, containing an Account of some of the most important Modern Algebraic and Geometric Methods," by G. Salmon (London, 1855); a "Treatise on the Higher Plane Curves," by the same author; *Traité de géométrie supérieure*, by M. Chasles (Paris, 1832); *Mémoire de géométrie sur les propriétés géométriques des coniques sphériques*, by Chasles (Brussels, 1831; soon after translated into English); *Aperçu historique sur l'origine et le développement des méthodes en géométrie, particulièrement de celles qui se rapportent à la géométrie moderne; suivi d'un mémoire de géométrie sur deux principes généraux de la science, la dualité et l'homographie*, by Chasles (Brussels, 1837; translated into German, Halle, 1839; a work which will richly repay a close study); *Systematische Entwicklung der Abhängigkeit geometrischer Gestalten von einander, mit Berücksichtigung der Arbeiten älterer und neuer Geometer über Porismen, projective Methoden, Geometrie der Lage, Transversalen, Dualität und Reciprocität*, by Steiner (Berlin, 1822); *Traité des propriétés projectives des figures*, by Poncelet (Paris, 1822); *Des méthodes en géométrie*, by Serret (Paris, 1855); *Mémoire sur les lignes du second ordre*, by Brianchon (Paris, 1817), and his *Mémoire sur les courbes de raccordement* (Paris, 1823); four books of Plücker of great merit, the *Analytische geometrische Entwicklungen* (2 vols. Essen, 1828-'31), *System der analytischen Geometrie auf neue Betrachtungsweisen gegründet und insbesondere eine ausführliche Theorie der Curven dritter Ordnung enthaltend* (Berlin, 1839), *Theorie der algebraischen Curven gegründet auf eine neue Behandlungsweise der analytischen Geometrie* (Bonn, 1839), and *System der Geometrie des Raumes in neuer analytischer Behandlungsweise, insbesondere die Theorie der Flächen zweiter Ordnung und Classe enthaltend* (2d ed. Düsseldorf, 1852); *Géométrie de position*, by Carnot (Paris, 1803), his *De la corrélation des figures de géométrie* (Paris, 1801), and his *Mémoire sur la relation qui existe entre les distances respectives de cinq points quelconques pris dans l'espace; suivi d'un essai sur la théorie des transversales* (Paris, 1806, and 4to. 1815); *Géométrie descriptive*, by

Monge, and his *Application de l'algèbre à la géométrie* (Paris, 1829, 1838); *Développements de géométrie, avec des applications à la stabilité des vaisseaux, aux déblais et remblais, au défillement, à l'optique, &c., pour faire suite à la géométrie descriptive* de G. Monge, by Dupin (Paris, 1813); Sir Isaac Newton's *Enumeratio Linearum Tertii Ordinis*; Euler's *Introductio in Analysin Infinitorum* (London, 1797; translated into French, Paris, 1796); "Lectures on Quaternions, by Sir William Rowan Hamilton, containing a systematic statement of a new mathematical method, of which the principles were communicated in 1843 to the royal Irish academy, and which has since formed the subject of successive courses of lectures, delivered in 1848 and subsequent years, in the halls of Trinity college, Dublin; with numerous illustrative diagrams, and with some geometrical and physical applications" (Dublin, 1853).

GEORGE (Lewis) I., king of Great Britain and Ireland, first sovereign of the Hanoverian line, born in Osnaburg, May 28, 1660, died near the same place, June 10, 1727. By the act of settlement, passed in 1701, the British crown was entailed on Sophia, electress dowager of Hanover, granddaughter of James I., and her posterity. Sophia died June 8, 1714, and so missed the throne to which she had been called by only 54 days, Queen Anne dying Aug. 1. George Lewis, her eldest son, was, like his father, the elector Ernest Augustus, partial to military pursuits, which he commenced at the age of 15. He served in Greece, Hungary, Germany, and Flanders, and was present at the great battle near Vienna in which John Sobieski defeated the Turks. He also served under William III., and took part in the battles of Steenkerke and Lauden. He succeeded his father in 1698. He sought the hand of Anne, daughter of the duke of York, in 1681, but failed; and in 1682 he married his first cousin, Sophia Dorothea, daughter of the duke of Zell, whose affections, if he ever possessed them, were soon alienated by his infidelities and brutality. Sophia Dorothea was suspected of an intrigue with a Swedish nobleman, Count Philip Christopher von Königsmark, and was arrested and imprisoned for 32 years in the castle of Ahlden, her supposed lover having previously been put to death. The elector was proclaimed king of Great Britain and Ireland immediately on the death of Anne, arrived in London Sept. 20, 1714, and was crowned Oct. 20. The majority of the English people were undoubtedly opposed to his accession, but the activity of the whigs was more than a match for the strength of the Jacobites and Tories. The rebellion of 1715, in Scotland and the north of England, was put down; and though there were many conspiracies entered into against him, and even foreign potentates and ministers planned his downfall, George I. was never in any danger of losing the throne to which he had been called by parliament. He was not a popular monarch, and the grossness of his tastes (he is said to have

been fond of nothing but punch and fat women) was not calculated to make his vices pardonable. Both he and his attendants regarded England as a land to be plundered. His quarrel with his son originated in politics, and dated back to years before the king's accession; but it was aggravated by the prince's attachment to his mother, the imprisoned Sophia Dorothea. After the family had secured the British throne, the father and son behaved toward one another quite decorously for a time, the prince acting as regent during the first of the many visits which the king made to Germany. This state of things did not last, and the king soon came to hate his son almost as bitterly as he hated his wife. There were separate courts, the prince of Wales residing at Leicester house, and the king declared that he should regard all who visited his son as his enemies, to be excluded from the royal presence. The quarrel became one of the scandals of the time, and as it was followed by similar quarrels in the royal family, the triumph of constitutionalism was coupled with domestic dissensions. The king connected himself with the whigs, whose long ascendancy in the 18th century dates from his accession. The ministry of 1714 contained such men as Townshend, Stanhope, Cowper, Halifax, Sunderland, and other eminent whigs. Robert Walpole, who was soon to be the leading minister, had at first no higher place than that of paymaster-general, and did not belong to the cabinet. His talent was so superior, however, that in 1715 he was made first lord of the treasury, which office did not then confer the premiership, though it was in his person that it finally became the first place in the ministry. The breach that took place in the whig party in 1717 caused Walpole, Pulteney, and others to resign their places, and the Stanhope-Sunderland ministry was formed. Previous to this the septennial act was passed, by which the legal existence of each house of commons was extended to 7 years, a proceeding that worked well, though it was in opposition to old whig principles. The new ministry formed the quadruple alliance, by which England, France, the empire, and Holland united to preserve the peace of Europe. The short war that followed was very humiliating to Spain. Admiral Byng annihilated the Spanish fleet at Passaro. The government was very strong both at home and abroad, all the plots in favor of the Stuarts having failed, while the schemes of Alberoni and Görtz had ruined only those who had formed them. A sort of reconciliation had been effected between the king and the prince of Wales. Everything appeared prosperous, when the bursting of the South sea bubble wrought the ruin of the ministry, and it was even expected that the king would abdicate. The ministry were held responsible, not only for the South sea act, which was indeed their work, but for the mad speculations that had followed its passage. Stanhope was seized with a fit while replying in the house of lords to an unjust attack,



and died; Oragga, secretary of state, died of small pox, and Sunderland left the treasury. Walpole, who had not been in office when the act was passed, took the lead in the work of change, and was made Sunderland's successor. The latter soon dying, peace was restored, and Walpole's long turn of power began with a new house of commons, in which the now united whigs had a heavy majority. The hopes of the Jacobites had revived, and a plot was formed for an insurrection in 1722, which was detected, and Bishop Atterbury was banished for his part in it. Walpole's love of power, and resolution to monopolize it, led to dissensions in the ministry. Carteret was compelled to give up the place of secretary of state, and go to Ireland as lord lieutenant, where Swift had raised a storm against Wood's halfpence. Walpole was jealous of his relative Townshend, who had become conspicuous from the part he had in making the treaty of Hanover, by which an alliance was formed between England, France, and Prussia, in opposition to Austria, Russia, and Spain. The king did not like the measure, and Walpole disapproved of it because of the consequences it gave to Townshend; but the time had not come for an open breach between them. William Pulteney, so celebrated for his eloquence and his avarice, was removed from a petty office in the royal household, for his opposition to a motion for discharging the civil list debts. The union of Spain and the empire came near to bringing about a general war in the last year of George I., but Walpole, whose merit it was ever to prefer peace to war, averted the danger. At this time Bolingbroke, who had been allowed to return to England, though not to resume his former state, was engaged in strong efforts to overthrow Walpole. Having secured the interest of the duchess of Kendal, the king's mistress, he was confident of ultimate success with the king, who at first treated his representations of the evils that must follow from Walpole's continuance in power with contempt. But the reign of George I. was drawing to a close. He loved Hanover and disliked England, and often visited his German dominions, which gave rise to much animadversion from the Jacobites. On June 8, 1727, he left England for Hanover, accompanied by the duchess of Kendal and Lord Townshend. On the 10th, while in his carriage, he was seized with a fit, and died before the party could reach Osnaburg, though attempts were made to revive him after they arrived there, where his death is generally stated to have happened. He is said to have been fully impressed when he left England with the belief that he never should return, and among the gossip of the time was a story that he had been warned that he should not survive his wife a year; she died at Ahlden, Nov. 2, 1726. He was a man of moderate faculties, and but for the circumstance that his fortunes happened to be identified with those of the constitutional party in a great nation, he probably never would have been more heard of than a thousand other

German princes whose very names are unknown. He was a cruel husband, a bad father, and a vicious man, and yet by no means a bad sovereign; but this distinction was owing to the constitutional restraints that were imposed on him, and to the want of knowledge on his part of the nature of English politics and parties. The union of England and France, which was the chief event of the reign of George I., and which was brought about by the very party that had upheld the war policy in Anne's reign, shows a breadth of policy such as was not common in that age; yet it ought to be mentioned, that this alliance was dictated by the circumstances of both governments, it being for the interest of the Hanoverian dynasty and the whigs that the connection between France and the Stuarts should cease, and that the reliance of the Tories on that country should be broken up; while the hope of the duke of Orleans, then regent, that he might come to the crown of France, when he would need foreign support, made it equally for his interest that both England and Holland should be engaged on his side.

GEORGE (AUGUSTUS) II., son of the preceding and of Sophia Dorothea, born in Hanover, Oct. 30, 1683, died at Kensington palace, Oct. 25, 1760. But little is known of his early history, except that he was neglected by his father, and that he was brought up by his grandmother, the electress Sophia. He visited Holland in 1699, and in 1705 was married to Wilhelmina Dorothea Caroline, daughter of the margrave of Brandenburg-Anspach, a woman of marked character and superior talent. The next year he was made a peer of England, his chief title being duke of Cambridge, with precedence over the peerage. He made the campaign of 1708 under the duke of Marlborough, and conducted himself with great bravery at the battle of Oudenarde, having his horse shot under him. In the opposite ranks, and showing equal valor, was the pretender, son of James II. He accompanied his father to England in 1714, and took the titles of prince of Wales, and earl of Chester and Flint, Sept. 27. The quarrel between father and son broke out soon, and they hated each other cordially. The prince had been preferred by the electress Sophia to her own son, and that son was attached to his mother, two causes that sufficed to increase his father's original dislike of him; but political differences were the groundwork of the quarrel. The king also hated the princess of Wales, and was jealous of her popularity. So vindictive was his feeling, that he entertained a proposition, made by the earl of Berkeley, to carry off the prince to America, there to be so disposed of as never to trouble his father again. The king sought to deprive his son of all control of his children, and 10 of the 12 judges decided in his favor. A sort of reconciliation was effected in 1720, through Walpole's influence, but the parties hated each other as bitterly as ever, their formal intercourse being a hypocritical tribute to

public opinion. When he ascended the throne, George II. endeavored to transfer power to the hands of Sir Spencer Compton, but his incapacity was so evident that Walpole retained his place, the more easily that he was supported by Queen Caroline, who saw that he was the man for the times and for the dynasty. The coronation took place Oct. 11, 1727. The pretender, on hearing of the death of George I., had made some movements, and the Jacobites had their hopes roused, but the new king was not in the least disturbed thereby. The history of the first 14 years of the reign of George II. is that of the struggle of Walpole and the opposition, the fiercest civil political contest, unstained by blood, that England has ever known. The hopes that had been entertained of Walpole's overthrow, as a consequence of the death of George I., had been disappointed, and that great minister's power was now fixed on a firm basis, from which it could never have been shaken but for his jealousy of all able men. The new parliament contained an overwhelming ministerial majority, and the king soon became strongly attached to the minister both on personal and political grounds. The royal avarice was gratified and the royal ease consulted by the minister, and hence the king supported the latter with all his influence; but the support he received from the queen, who governed her husband without his knowing it, was of greater importance. George II. was as fond of Hanover as his father had been, and visited it often, to the disgust of his English subjects. He hated his son Frederic, prince of Wales, as bitterly as he had himself been hated by his father, and the queen shared his feelings in that respect. Frederic was not allowed to visit England until 1738. The fault was originally on the side of the parents, and the prince long bore the king's harsh treatment without complaint, and perhaps would have done so to the last if it had not been for the interest of the opposition to make him acquainted with his political importance, and to stir him to resentment, because the king supported Walpole personally. The first great act of this reign was the treaty of Seville, concluded in 1739, between England, France, Spain, and Holland, which was very advantageous to England, and by which Spain silently acquiesced in the English possession of Gibraltar. Walpole quarrelled with his colleague Townshend in 1730, and the latter resigned office, and retired altogether from public life. Walpole was supreme in the cabinet, and appears to have been disposed to make some improvements in the laws, and to correct abuses; but the virulence with which all his measures were opposed in parliament compelled him to be cautious. The use of Latin in the courts of justice was discontinued, and English substituted. The sinking fund, which Walpole himself had aided to establish, was now so encroached upon that it soon ceased to be of any value. The great contest on the excise question now commenced, and was the most remarkable incident of the first half

of the reign. The mere report of the intention to introduce a scheme of general excise caused alarm, and the opposition, which had been reduced very low, immediately became vigorous. The battle was fought with ability and courage on both sides, and though in some of its stages the ministerial majorities were 60, they finally fell to 16, in a house of commons which had given Walpole almost 200 majority on other questions. The bill was then withdrawn, greatly to the satisfaction of the people. The king was as much beaten as the minister, and they revenged themselves by dismissing from office, or from sinecure places, a number of distinguished noblemen who had been prominent in opposing the measure, the chief of whom was Lord Chesterfield. The election of 1734 resulted in the return of a strong Walpolean majority. The opposition sought the repeal of the test act, and were beaten by 128 majority. The gin act, which sought to do something to lessen drunkenness, was passed in 1736. The prince of Wales was married in 1736, and the question of his income afforded the opposition means to annoy the ministry, and caused the quarrel between father and son to become bitterer than ever. The queen died in 1737, recommending her husband to Walpole with her last breath. The opposition endeavored to have the army reduced in 1738, but failed. They then assailed the ministry because of its indifference to the outrages perpetrated by the Spaniards in America on Englishmen there trading. An arrangement made with Spain was unpopular. The ministerial majority was greatly reduced, but the minister was saved by the folly of his enemies, a number of whom seceded. The troubles with Spain went on, and war was declared against that country, Oct. 19, 1739. The ministerial strength now diminished, and the hopes of the Jacobites revived. The war was by no means brilliantly conducted. Anson's cruise in the Pacific and Indian seas revived the recollections of the Elizabethan age, and Vernon took Portobello; but the English failed at Oathagena, and also at Santiago de Cuba. The war of the Austrian succession began in 1741, and England was drawn into it. Parliament was dissolved, and the new elections took place under circumstances unfavorable to Walpole. When parliament assembled, the opposition found themselves in a majority, and after a hard battle Walpole gave way, much to the grief of the king, who continued to take his advice to the last days of his life. Sir Robert was created earl of Orford, and the attempts made to prosecute him fell through. Lord Wilmington became premier, and Carteret secretary of state. Success was ruinous to the opposition, which showed it could not administer affairs, though so eloquent in fault-finding. The public was greatly disappointed, and the refusal of the victors to repeal the septennial act, which had been the object of their especial indignation when out of office, caused much disgust. England had now become actively engaged in the

Austrian war, and sent a large force to Flanders, which did nothing. Some success was achieved by the navy, and a British squadron compelled Naples to observe a neutrality. The king, who was fond of military life, and personally brave, was desirous of placing himself at the head of an army, and a large German force was taken into English pay. This added to the hatred of Hanover already felt in England. The king joined the allied army, June 19, 1743, and 7 days later was fought the battle of Dettingen, in which the French were beaten, the monarch showing much courage. The death of Lord Wilmington led to Henry Pelham's elevation to the premiership, the king acting under the advice of Walpole. Carteret continued to manage foreign affairs, and was much liked by the king. The Hanoverian policy was still vigorously opposed, but the resolute conduct of France, the fear of invasion, and the revival of the Jacobite party, caused some remission of party feeling, and the adoption of strong measures by government, the whigs of all views uniting in their support. The French government called Charles Edward Stuart to France, and extensive preparations were made to invade England, which failed through the occurrence of a severe storm, the fleet being destroyed or dispersed. Lord Carteret, now Earl Granville, was compelled to leave the ministry, and Pelham forced the king to admit Chesterfield and some others of the old opposition to office. The Hanoverian policy was kept up, despite these changes, and England entered on an extensive system of German subsidies. Great preparations for the campaign of 1745 were made, but with no gain to England. The allies were beaten by the French at Fontenoy, when under command of the duke of Cumberland. Charles Edward landed in Scotland, was joined by many Highlanders and others, and, after occupying much of the ancient kingdom of his race, marched into England as far as Derby, when his leading supporters compelled him to retrace his steps. He had won the victory of Gladsuir, and it is now the current opinion that if he had pressed forward from Derby to London the capital would have fallen into his hands. George II., though very brave, and prepared to place himself at the head of his guards for a last fight, made preparations to fly. The rebels defeated the royal troops at Falkirk, but 3 months later their army was annihilated at Culloden. From that time dates the extinction of the Stuart party. The rest of the war was inglorious, and it was terminated by the treaty of Aix la Chapelle in 1748. For some years there was but little political discussion, and the opposition had dwindled into a small faction, headed by the prince of Wales, which became extinct soon after his death in 1751. Private bills excited more interest in parliament than those of a public character. An increase in the stringency of the mutiny bill, and the passage of a regency bill, caused some discussion. The reformation of the calendar was

effected in 1752, providing that the year should commence Jan. 1 instead of March 25. The bill for the naturalization of the Jews was passed in 1753, and, though one of the most creditable acts of English legislation, caused so much popular excitement that it was immediately repealed. The premier died March 6, 1754, and was succeeded by his brother, the duke of Newcastle, who found himself compelled to share power with others. His first ally was Henry Fox, afterward Lord Holland, and at a later day William Pitt. The 7 years' war began in 1756, and England was involved in a contest of the severest character with France, while at the same time she was the ally of Prussia, which was at war with France, Russia, the empire, and lesser powers. The contest extended over the world, and was marked by great actions in Europe, in North America, and in the East Indies. The early part of the war was inglorious to England, but shortly after the formation of the Pitt and Newcastle ministry in 1757, the genius of Pitt changed the fortune of the contest, and the English were triumphant in every quarter. Ample subsidies were furnished to Frederic of Prussia, so that he was enabled to make head against the coalition formed for his overthrow. An army of English and Germans defeated the French in Germany, at Orefeld, Minden, and elsewhere. North America was the scene of great operations, which ended in the expulsion of the French. An expedition to France, twice renewed, inflicted considerable damage on that country, destroying, among other things, the works at Oherbourg. The success of Clive laid the foundation of the British Indian empire. Senegal and Goree were conquered; and the victory of Admiral Hawke over Conflans, in the naval battle of Quiberon, established English supremacy on the ocean. Never had England stood so high as she stood in 1760. In the midst of these successes, forming so striking a contrast to most of his reign, George II. suddenly died, at the age of 77. He was a man of ordinary character, and never had been popular with his English subjects; but he had governed constitutionally, and in his reign the liberal polity was fairly established. The industrial system of England then began to display itself, and the world saw the first evidences of that power which was to receive a development so vast and unparalleled. Personally the monarch had little to do with these things, but he was the chief in the political system under which and through which they came to pass. As a despot he would probably have proved a bad ruler, for his tastes were arbitrary, and so were his acts when he was not restrained by law and circumstances; but as a constitutional sovereign he has a respectable place in history.

GEORGE (FREDERICK WILLIAM) III., grandson of the preceding, and son of Frederic, prince of Wales, and of Augusta of Saxe-Gotha, born June 4, 1738, died at Windsor castle, Jan. 29, 1820. He was not likely to be

well educated in the court of his father, nor did the death of that parent improve his prospects in that way. He was brought up more as a Stuart prince might have been than as the heir apparent to the throne of a constitutionally governed state. His disposition was both arbitrary and crafty, and the whole of his long reign, until the time that he lost his intellect, was passed in a continual combat against liberal ideas and institutions. At first he was popular. Young, a native of the country, and but little known to the people, his accession (Oct. 25, 1760) was hailed with loud rejoicings. This fair dawn was soon overcast, and for more than 20 years he was the most unpopular monarch of his time. He was married, Sept. 8, 1761, to the sister of the duke of Mecklenburg-Strelitz, Charlotte Sophia, the Queen Charlotte of 57 years, a marriage from which proceeded 15 children, all but two of whom grew up. The new king was averse to the system which his two predecessors had pursued, and was resolved upon being a king in fact as well as in name. To afford an opportunity to attempt the inauguration of the new system, it was necessary that peace should be restored, though the war was very popular, and Pitt, the war minister, was at the height of his power. The earl of Bute, long connected with the king's father and mother, was introduced into the cabinet, and ultimately became premier, and put an end to the war, though not until a new war had been made, in consequence of Spain having joined France. When the family compact was made between France and Spain, Pitt was for anticipating the latter, and commencing the war, but was overruled in the cabinet, where almost every man hated him because of his inordinate egotism and arrogance. He resigned his office, but the event showed the wisdom of his advice, for the conduct of Spain was such that England was compelled to declare war against her, Jan. 4, 1762. This war was a series of successes on the part of England. Havana was captured, with a large part of the island of Cuba, the Philippines were reduced, and treasure ships of immense value were taken from the Spaniards. The effect was to make the minister more determined than ever upon peace, which was finally brought about at Paris in 1763, on terms that were honorable to England, though party spirit caused them to be denounced as treacherous, insecure, and disgraceful. The king became unpopular, and the minister was the object of violence. The restoration of peace enabled the king to seek the development of his political plans, and for many years he was engaged in a warfare against those principles to uphold which his house had been called to the British throne, to the exclusion of the legitimate line. Ministry succeeded to ministry, the king hating all alike, with this difference, that he was more treacherous in his conduct toward the whigs than toward the Tories. Then it was that "the king's friends" were first heard of, a class of politicians who were neither whigs nor Tories, but who did the

king's work without inquiry, and constituted a political militia. The parliament was generally with the king, but the people were not; and so ready were the latter to oppose the monarch, that they made an idol of the worthless John Wilkes. It was while George Grenville was minister, in 1765, that the stamp act was passed, which threw the North American colonies into a blaze, and was the first in that series of acts which in their entirety make up the American revolution. At length, at the beginning of 1770, Lord North became premier, having been chancellor of the exchequer for some time, and he held the place for 12 years. The modern Tory party dates from that time as a powerful and efficient organization. The king ruled as well as reigned, and the attacks on American liberty were his acts, the guilt of the minister consisting in his being the tool, against his own convictions, of a master who was not always in possession of his reason. The dreariest period of modern English history is the time in which Lord North was prime minister. The American war began in the spring of 1775, and for 7 years the most desperate efforts were made to conquer the colonies, which in 1776 declared themselves independent states. Beside large bodies of English troops, and Tories and Indians recruited in America, thousands of German mercenaries were employed in the war, which was marked by just enough of success to encourage the king to persevere. Gradually other countries were drawn into the contest, until it had assumed a European character. War between France and England began in 1778, and Spain and Holland were soon ranked in the number of England's active enemies. The northern powers formed the armed neutrality. The combined fleets of France and Spain obtained command even of the English channel. Gibraltar was beleaguered by an immense fleet. The army of Burgoyne surrendered to the Americans in 1777, and 4 years later that of Cornwallis capitulated to the allied forces of America and France. The fortunes of England were never before so low, and though the successful defence of Gibraltar, and the naval victory won by Rodney over De Grasse, closed the war with some flashes of glory, the contrast between the state of things then and 20 years before was most humiliating to all reflecting Englishmen. The king was compelled to submit to a Whig ministry, headed by the marquis of Rockingham and Charles James Fox. Lord Rockingham's death caused the new ministry to fall to pieces, and power passed into the hands of the earl of Shelburne and the younger William Pitt. American independence was acknowledged, and peace restored, though the king was even then resolute to continue the contest, and talked of retiring to Hanover because of the coercion to which he was subjected. The Shelburne ministry was driven from power by the famous coalition of the Foxite Whigs with the Tories who followed Lord North. The king hated this ministry intensely, and talked of going to Hanover more than ever, and

probably did not go because of the hint that while it would be easy to reach that country, it would not be so easy to get back to England. His submission was short-lived. The coalition broke down in an attempt to put a stop to the misgovernment of India. Its India bill passed the commons, but was thrown out by the lords in consequence of royal influence having been brought to bear on the minds of some of the peers. The king then dismissed the ministry, and placed Pitt at the head of his councils. After the new ministry had carried on a conflict with the coalition party in the commons until the latter had lost its majority, parliament was dissolved, and in the elections that followed the coalition was annihilated. The king was now as popular as formerly he had been odious, and the tory party commenced a reign of more than 40 years. The prince of Wales was now of age, and had commenced that loose life which has made his name and title by-words, and which was all the more distasteful to the king because the prince's associates were mostly whigs. As George I. had hated his eldest son, and George II. followed his father's example, so did George III. hate the heir apparent. Public affairs went on smoothly, save that the impeachment of Hastings, who was patronized by the king, was brought about by the aid of Pitt. In 1788 the king was severely assailed by that illness to which he was liable throughout his long life, and which finally rendered him incapable of attending to business. A fierce struggle was commenced between parties, the object of the whigs being to have the prince of Wales made king under the title of regent, should the royal illness continue, while the tories were determined materially to abridge the powers of the regent. The recovery of the king put an end to the contest. Immediately after his recovery occurred the commencement of the French revolution, an event that arrested his attention; and that great movement found in him the most determined of its enemies. Before the breaking out of the war with France, a dispute took place with Russia, the object being to prevent the conquest of Turkey by Catharine II. The opposition rallied and gained strength, but Turkey was saved. Another dispute occurred with Spain, but did not lead to war. The war with revolutionary France began in 1793; and though the English maintained their naval character, defeating the French on June 1, 1794, at the Nile on Aug. 1, 1798, and elsewhere, the Spaniards at Cape St. Vincent, Feb. 14, 1797, and the Dutch at Camperduin, Oct. 11, their military character was not raised by its events. The most arbitrary rule was established at home, and nothing but the firmness of English juries prevented the establishment of as complete a reign of terror in Great Britain as existed in France. Ireland was oppressed until she was goaded into rebellion, which was suppressed by measures as cruel and bloody as any perpetrated by the French republicans in La Vendée and Brit-

tany. The union between Great Britain and Ireland was effected in 1800, the parliament of the latter ceasing to exist, while she was allowed to send 100 members of the house of commons and 80 representative peers to the imperial parliament. Peace was made with France in 1801, though against the king's wishes, his opinion always being in favor of bloodshed, unless his enemy should unconditionally submit. The French had been driven out of Egypt, and Malta captured from them. The peace was but a hollow truce, and the refusal of the English to give up Malta led to the renewal of the war in 1803. The Pitt ministry had broken down, really on the question of peace with France, but ostensibly because of the king's bigotry, he refusing relief to the Catholics, though it had been understood it was to be granted as one of the conditions of the Irish union. Henry Addington became premier, and kept his post until after the renewal of the war, when Pitt returned to office. The threats of Napoleon to invade England, and the vast preparations he made for that purpose, caused the people to rally around the throne, and an immense force was on foot, of regulars, militia, and volunteers, while the navy was much increased. Spain was drawn into the war on the side of France, and their united fleets were destroyed at Trafalgar, which made England irresistible on the ocean, and settled the invasion question for that generation. For some time the war on the part of England was principally confined to the ocean, though she assisted the enemies of France with money. Such military expeditions as she fitted out were on a small scale, and mostly failed. In South America, in Egypt, in the north of Europe, her armies were either beaten or accomplished nothing; and it was not until the breaking out of the Peninsular war in 1808 that, under the command of Moore and Wellesley, they performed any thing worthy of the high name of their country. Pitt died in 1806, and the government passed into the hands of a coalition ministry, of which Lord Grenville and Mr. Fox were the chiefs. The object of the latter was the restoration of peace with France, but he died before any thing could be done. The coalition endeavored to grant some relief to the Catholics, but the king got rid of them, and a ministry of tories was formed, headed by the duke of Portland. This ministry was probably the worst England ever had, and though it succeeded in the attack on Denmark, taking possession of the Danish fleet, the immorality of that attack more than balanced its success. Operations in Spain and Portugal were badly conducted; and the Walcheren expedition in 1809, which might have struck a deadly blow at Napoleon's power while he was combating Austria on the Danube, was probably the worst managed undertaking mentioned even in English history. This failure led to the breaking up of the Portland ministry, for which the Perceval ministry was substituted, an improvement on its predecessor, inasmuch as Mar-

quis Wellealey took the foreign office. The commencement of the 50th year of the king's reign, Oct. 1809, was observed as a jubilee. There was little occasion for rejoicing. The war had failed utterly on land; France ruled almost the whole of continental Europe; the disputes with the United States threatened to add a new enemy to those England already had; while the conduct of some of the king's sons was flagrantly profligate. His 2d son, the duke of York, was compelled to resign the post of commander-in-chief, in consequence of the exposures made by Mrs. Clarke. In 1810 died the princess Amelia, the king's youngest and favorite daughter, and the king suffered so much from anxiety during her illness that he lost his reason for ever. More than once he had been raving mad, and it is doubtful if he ever was sane in a strict medical sense. The first indications of his disease appeared on the very day of the completion of the 50th year of his reign, Oct. 25, 1810. His reign ceased in fact from that date, but in law it lasted more than 9 years longer. The prince of Wales became prince regent, and after some coquetting with the whigs, gave his confidence to the Tories, who became more powerful than ever. The turn taken by foreign events favored them. The invasion of Russia by Napoleon took place at the very time the Liverpool ministry was formed, after Mr. Perceval's death. The battle of Salamanca, the first open military blow struck at Napoleon's power, was won by Wellington, July 22, 1812. During the next two years the English and their allies were everywhere successful, and a series of brilliant operations, illustrated by the victories of Vittoria, the Pyrénées, Orthez, Toulouse, and others, carried Wellington's army far into France, at the same time that the allies penetrated to Paris and compelled Napoleon to abdicate. The allied sovereigns, attended by many of their statesmen and generals, visited England in June, 1814; and that visit, and the restoration of peace to Europe, led to great rejoicings. England, however, was still at war, the United States having declared war with her, June 18, 1812, which was terminated by the treaty of Ghent, Dec. 24, 1814. At the congress of Vienna, which assembled to settle the condition of Europe, England was represented by some of her leading statesmen, whose purposes were better than their deeds, though a treaty was entered upon to coerce Russia, the principal parties to which were Austria, England, and France. The return of Napoleon in March, 1815, led to a renewal of the war with France, which was speedily terminated by the successes of the English and Prussians in Belgium, and the rapid advance of the victors to Paris, which surrendered July 4, 1815. Napoleon gave himself up to the English and was sent to St. Helena, the prince regent taking no notice of the letter written to him by the illustrious prisoner. These brilliant successes confirmed the power of the Tories, but domestic government became difficult from the

general spirit of discontent that followed the peace, and harsh legislation was resorted to; while opinion in England began to exhibit itself against the despotic theories and practices of the holy alliance. Lord Castlereagh, who had done more than any other Englishman except Wellington to bring about the fall of Napoleon, was the principal member of the cabinet, holding the office of foreign secretary, though Lord Liverpool was nominally premier, and he was known to sympathize strongly with foreign despots, and was very unpopular. Falling by his own hand in 1822, he was succeeded by Mr. Canning, when the policy of England became more liberal. In the mean time, George III. died, after a reign of 59 years, 8 months, and 4 days, the longest known in English history, and most fertile in events. The empire had been greatly extended, principally in the East; but to balance these gains, the American colonies had been lost as a consequence of the king's misconduct, and a new power was growing up in the West destined to spread free institutions over a continent, and to react upon Europe.

GEORGE (AUGUSTUS FREDERIC) IV., son of the preceding and of Queen Charlotte, born Aug. 12, 1762, died June 26, 1830. Nature endowed him with fair talents, and he had all the advantages of education. His youth promised well, but on attaining his majority he commenced a course of extravagance, often ending in debauchery, that contrasted strongly with the decorous life of his father. He joined the whigs, but rather because his father hated them than from attachment to their principles, as he failed them in hours of trial, and ultimately became an extreme Tory. The nation was scandalized at his excesses, the cost of which it had repeatedly to defray, though his income was ample even for one in his high position. In 1795, though he had been secretly married for some years to Mrs. Fitzherbert, he espoused his cousin, Caroline of Brunswick, neither from love nor from motives of state policy, but to get his debts paid. After living together for a year, during which their only child, the princess Charlotte, was born, they separated by common consent. Anxious for a complete divorce, the prince endeavored to prove his wife unfaithful; but at most she was guilty while in England only of imprudent acts, and her father-in-law always protected her, not only because he had caused the marriage, but because he hated her husband. It was not until he became regent in 1810 that the prince of Wales assumed a political character of importance, and he then gave himself up to the Tories. At the head of the nation during those years when the long war with France was brought to so brilliant a conclusion, he shared in the glories achieved by the genius of Wellington, but was never personally popular. His daughter, the princess Charlotte, died in 1817. He became king, Jan. 29, 1820, and soon was commenced that open persecution of his wife which agitated the whole country. A bill of pains and penalties was introduced into

the house of lords, charging the queen with adultery. The trial lasted for many weeks, and the bill passed to a third reading Nov. 10; but the majority for it was so small and public opinion so decidedly pronounced against the prosecution, that the government withdrew it. Nominally victorious, the queen was really beaten, and died of chagrin in less than a year. The king visited Ireland, Scotland, and Hanover, and apparently was popular. He was, however, greatly perplexed by politics. The progress of liberal opinions was making itself felt in England, and the ministry had to go with the world. Castlereagh's suicide and Canning's promotion were sources of much trouble to him. The foreign policy of Canning was eminently distasteful to one with whom Napoleon had pleaded in vain. When a French army, at the bidding of the holy alliance, entered Spain to restore absolutism, England was greatly moved, and probably nothing but financial considerations prevented war with France. When Portugal appealed for English aid against Spain, that aid was promptly given. The Greek revolution added to the interest, which the English felt in foreign affairs from classical associations. Internal policy was liberalized. Peel led the way, though a tory minister, in meliorating the criminal law; Huskisson's commercial ideas began to make head; Brougham labored in the cause of education; and the work of Catholic emancipation went vigorously forward. The year 1824 was a period of great material prosperity, and was followed by a crash in 1825. Early in 1827 the duke of York, heir presumptive to the crown, died, and Lord Liverpool was incapacitated from further attention to business by illness. The contest that followed for the premiership ended in the triumph of Canning, whereupon 7 of his associates resigned, and he was compelled to reconstruct the cabinet, which he did on a liberal basis. He died, however, before he could accomplish any thing. His successor was Lord Goderich, whose ministry lasted but a few months, and was the weakest England had known for a long time. It was followed by the Wellington ministry, Jan. 1828, with the duke as first lord of the treasury and Peel as home secretary. This return of the tories to power was the signal for the revival of the emancipation agitation, and the Catholics proved successful in 1829. The ministry had to choose between giving up their principles and civil war, and they made the sacrifice required of them. The king, whose bigotry and dread of popular ideas increased with his years, stood out to the last against the current of opinion, but was forced to give way. The dissenters had previously been freed from disabilities. These acts, noble though they were, proved the ruin of the tory party, and so demoralized it that it could not stand before the feeling that was soon after roused over Europe by the French revolution of 1830. The king was taken seriously ill early in that year, and died June 26. The duke of Wellington, who was no flatterer, said of him after his death: "He

was the most extraordinary compound of talent, wit, buffoonery, obstinacy, and good feeling—in short, a medley of the most opposite qualities, with a great preponderance of good—that I ever saw in any character in my life." His short reign had been remarkable for the advance made in liberal sentiments, and for the many practical reforms which it had witnessed—changes with which the sovereign had little to do. The England of 1830 bore but small resemblance to the England of 1820, and still less to that of 1810, when, though as regent only, George IV. had commenced the life of a sovereign. He left no children of legitimate rank, and for the first time since the accession of the house of Hanover to the British throne a deceased king was not succeeded by son or grandson, the duke of Clarence, 8d son of George III., succeeding George IV. by the title of William IV.

GEORGE, prince of Denmark, born in 1653, died Oct. 28, 1708. He was the 2d son of Frederic III. and Sophia of Lüneburg. Upon the death of his father, war was renewed with Sweden, and the prince took part in his brother Christian V.'s campaign against Charles XI., when the rival kings commanded and fought in person. The prince is said to have gallantly seconded his brother's personal prowess. On July 28, 1683, he espoused the princess Anne of England, second daughter of the duke of York, afterward James II. She bore him 17 children, all of whom died before their mother's accession to the throne. The prince was wholly devoid of talent, as of ambition. "I have tried him drunk," said Charles II., "and I have tried him sober; and drunk or sober, there is nothing in him." He was, however, brave, good-natured, and humane; taking no part in politics, and deserting his unhappy father-in-law in the hour of need, chiefly by the desire and after the example of his wife. He had been brought into the conspiracy through her subservience to Churchill, the future duke of Marlborough, but his extreme insignificance rather excited the raillery of the king, even on this sad occasion. "After all," said James, hearing of his defection, "a good trooper would have been a greater loss." After the triumph of the prince and princess of Orange, Prince George was created by the new king duke of Cumberland, in acknowledgment of his coöperation in the great measure which had been achieved; and on the accession of his wife, the "good Queen Anne," to the throne, in 1702, he was made lord high admiral of England. He had previously been invested with the title of generalissimo of all the queen's forces. As admiral he was assisted by a council consisting of 4 members. The legality of this board was much doubted, but the parliament had such respect and veneration for the queen, that it was suffered to act without question.

GEORGE OF TREBIZOND, a learned Greek, one of the principal actors in the contest which broke out in Italy about the middle of the 15th

century between the disciples of Aristotle and those of Plato, born in the island of Oreta, April 4, 1396, died in Rome in 1486. He arrived in Italy in 1480 upon invitation of Francesco Barbaro, a noble Venetian, and became professor of Greek literature and philosophy at Venice. Pope Eugenius IV. invited him to Rome in the same capacity, and made him his secretary; and he was continued in these functions by Nicholas V. Though he was famous throughout Italy, some of his hasty translations of the Greek authors into Latin drew upon him attacks from Lorenzo Valla and Theodore Gaza, and his eulogies of Aristotle and attacks upon Plato provoked the enmity of the Florentine admirers of Plato, and particularly of Cardinal Bessarion. His subsequent life was a series of disputes with the contemporary scholars, and his writings are less remarkable for philosophic insight than for violent personalities.

GEORGE, LAKE, or HORROR, a picturesque sheet of water in Warren and Washington cos., N. Y., 36 m. long, from  $\frac{1}{2}$  of a m. to 4 m. wide, and in some places 400 feet deep. It is remarkable for the transparency of its water, its multitude of little islands, popularly supposed to correspond in number with the days of the year, and the beautiful scenery of its banks. Black mountain, on the E. shore, has an elevation of 2,200 feet above the surface of the lake, and 12 m. distant from it is an almost perpendicular rock rising 200 feet from the water, down which it is said Major Rogers, when pursued by Indians during the French war, slid and landed safely on the ice. Not far from this spot is the place where the English under Lord Howe landed previous to their attack on Fort Ticonderoga. The ruins of that fort can be seen at the E. end of the narrow channel through which the waters of Lake George are conveyed to Lake Champlain. Lake George was discovered by the French from Canada in 1609, and was named by them Lake St. Sacrament. Its pure waters were regularly transported to Canada to be consecrated for use in the Roman Catholic churches for baptism and other sacred purposes. The English subsequently named it after King George I. By the Indians it was called, among other names, the Horicon. It bears a conspicuous place in American history. For more than a century it was the channel of communication between Canada and the settlements on the Hudson. In the 7 years' war it was repeatedly occupied by large armies, and was the scene of several battles. On Sept. 6, 1755, occurred engagements between the French and English, near the S. end of the lake, in which Col. Williams of Massachusetts, the founder of Williams college, was killed, Baron Dieskau, the French commander, severely wounded, and the French totally defeated. In 1757 Fort William Henry, at the same end of the lake, was besieged by the French general Montcalm, at the head of 10,000 men. The garrison, after a gallant defence, capitulated, and were barbarously massacred by the Indian allies of the French. In July,

1758, the army of Gen. Abercrombie, 16,000 strong, passed up the lake in 1,000 boats, and attacked Ticonderoga without success. In July, 1759, Gen. Amherst with an almost equal force also traversed the lake and took Ticonderoga and Crown Point. The head of Lake George was the depot for the stores of the army of Gen. Burgoyne before he began his march to Saratoga.

GEORGE, SAINT, the patron saint of England, a personage whose character and very existence are surrounded with much obscurity. According to Papebroche, Heylyn, and others, he was a soldier in the army of Diocletian, and suffered death for the Christian faith. He was canonized before the 6th century, and was held in special reverence by warriors. The eastern Christians gave him the surname of the Victorious. The English crusaders brought the knowledge of him into their own country, and Edward III. made him the patron of the order of the garter, whence he came to be regarded as the tutelar saint of chivalry and the protector of England. Many writers regard him as identical with a native of either Cappadocia or Cilicia, who raised himself by flattery of the great from the meanest circumstances to be purveyor of bacon for the army. He acquired wealth by peculation, and fled from justice to Alexandria in Egypt, where he embraced Arianism, and on the expulsion of Athanasius was made patriarch of that see. His spoliations and violence so exasperated the people that they drove him from the city, and it required all the civil and military power of the province to reinstate him. On the accession of the emperor Julian he was cast into prison, whence he was forcibly taken by a mob and put to death with two of his ministers (A. D. 361). St. George is commonly represented on horseback with a dragon vanquished at his feet, this attribute probably having reference to the monster mentioned in the book of Revelation.

GEORGETOWN, an E. district of S. Carolina, bordering on the Atlantic, bounded S. W. by Santee river, and intersected by the Great Pedee, Black, and Waccamaw, which unite just above the seat of justice, and enter the ocean through the estuary called Winyaw bay; area, 818 sq. m.; pop. in 1850, 20,647, of whom 18,253 were slaves. The surface is level and partly occupied by marshes and pine forests. The soil is generally fertile, and admirably suited for rice, more of which was produced here in 1850 than in any other county or district of the United States except Beaufort, S. C. The productions that year were 46,765,040 lbs. of rice, 136,312 bushels of Indian corn, 209,800 of sweet potatoes, and 81 bales of cotton. There were 6 grist mills, 2 saw mills, 1 iron foundry, 2 newspaper offices, 26 churches, 281 pupils in academies, and 170 pupils attending public schools. Capital, Georgetown.

GEORGETOWN. I. A city and port of entry of Washington co., D. C., situated at the head of navigation on the left bank of the Potomac, 125 m. from its mouth and 2 m. W. of



Washington; pop. in 1854, about 10,000. It is separated from Washington by Rock creek, which is crossed by 2 bridges. On the N. and W. it is overlooked by heights, commanding a magnificent view of Washington and the Potomac, and a vast expanse of country, and crowned by villas and country seats, among which are the residences of some of the foreign ministers. It is a quiet, antiquated city, noted for its refined society and educational advantages. It contains several excellent hotels, and in 1850 had 2 newspaper offices, 2 banks, a market house, 7 or 8 churches, and a few mills. The most important of its literary institutions is Georgetown college, under the control of the Jesuits. Near the college is a convent of Visitation nuns, and attached to the latter a female academy, usually numbering about 100 pupils. There are several private boarding and day schools, some of which enjoy a high reputation. On the N. W. slope of the heights is the beautiful Oak Hill cemetery, thickly planted with trees and encompassed by an iron fence; it was laid out in 1849. The Alexandria branch of the Chesapeake and Ohio canal, from Alexandria, Va., to Cumberland, Md., passes through the city, and is carried across the Potomac by an aqueduct 1,446 feet long, and 86 feet above the ordinary tide. Georgetown is the only port of the district of Columbia, and its foreign commerce and coasting trade are important. (See DISTRICT OF COLUMBIA.) II. A port of entry and the capital of Georgetown district, S. C., on the W. shore of Winyaw bay, near the confluence of the Great Pedee, Black, and Waccamaw rivers, 15 m. from the sea, and 132 m. S. E. of Columbia; pop. in 1850, 1,628. The entrance to the harbor is obstructed by a bar, and this, together with the former reputation of the place for unhealthiness, for a long time checked its prosperity. Its climate, however, has improved, owing to a change in the cultivation of the neighboring rice fields. It contains the county buildings, a bank, 5 or 6 churches, an academy, several steam saw mills and turpentine distilleries, one or two newspaper offices, &c. The tonnage of the district for the year ending June 30, 1858, amounted to 1,630 registered and 76 enrolled and licensed; number of vessels entered, 11, tons 1,992; number of vessels cleared, 45, tons 8,217; value of imports, \$1,270; value of exports, \$36,174. III. The capital of Scott co., Ky., built on high ground in the midst of a fertile region on the North Elkhorn river, 17 m. E. of Frankfort; pop. in 1854, about 2,000. It contains woollen, bagging, and rope factories, and a printing office, issuing a weekly newspaper and a monthly magazine. It is the seat of Georgetown (Baptist) college, founded in 1840, occupying a building 100 feet long by 60 feet wide, and having, in 1858, 8 professors, 132 students, and a library of 7,500 vols.; of the female collegiate institute, founded in 1838, having a good chemical and philosophical apparatus, and about 100 pupils; and of the western military institute, a flourish-

ing institution which unites civil education with military discipline.

GEORGETOWN (Dutch, *Stabroek*), the capital of British Guiana and of the county of Demerara, situate on the E. bank of Demerara river, at its mouth, here about 2 m. wide; lat.  $6^{\circ} 49' 24''$  N., long.  $58^{\circ} 11' 30''$  W.; pop. in 1843, 28,000, of whom only 4,000 were whites; in 1851, 25,508. It is regularly built, with broad, clean streets, intersecting at right angles, and neat wooden houses having open verandas in front, thickly shaded and surrounded by gardens. Canals communicating with each other and with the river run through the middle of most of the streets, and are crossed by numerous bridges. The great business thoroughfare, in which are most of the shops and warehouses, is Water street, facing the river, and this is the only quarter inhabited exclusively by Europeans. The principal edifice is the town hall, a large, elegant stone building, with marble-paved galleries supported by cast iron columns. It contains the council hall, courts of law, custom house, treasury, and all the other public offices. The Episcopal cathedral is a handsome stone building, beside which there were in 1855 one Episcopal and 10 other churches, a great number of schools, a mariners' hospital, a colonial hospital, a lunatic asylum, botanical and astronomical societies, 2 banks, 3 newspaper offices, barracks, 2 theatres, and a market place surrounded by well-supplied shops. Below the town is Fort Frederic William, a place of little apparent strength, connected with which is a military hospital; and near it, at the mouth of the river, is an excellent lighthouse. Georgetown is unhealthy, owing to its low, marshy situation. By way of security against dampness the houses are raised on piles 3 or 4 feet above the ground. Diarrhoea, dysentery, dropsy, and yellow and intermittent fevers are prevalent diseases. There is a bar at the mouth of the river, on which there is 15 feet of water. The shipping of the port in 1853 consisted of 591 vessels with an aggregate burden of 101,764 tons. The principal exports are coffee, sugar, and rum.

GEORGIA, one of the 18 original states of the American Union, situated between lat.  $30^{\circ} 21'$  and  $35^{\circ}$  N. and long.  $80^{\circ} 48'$  and  $85^{\circ} 40'$  W., having an extreme length N. and S. of 820 m., and an extreme breadth E. and W. of 254 m.; area, 58,000 sq. m., or 87,120,000 acres. It is bounded N. by Tennessee and North Carolina (on the 36th parallel), W. by Alabama and the Chattahoochee river, S. by Florida and St. Mary's river, E. by the Atlantic ocean, and N. E. by the Savannah river, which separates this state from S. Carolina. It is divided into 112 counties viz.: Appling, Baker, Baldwin, Bibb, Bryan, Bullock, Burke, Butts, Calhoun, Camden, Campbell, Carroll, Cass, Catoosa, Chatam, Chattooga, Chattahoochee, Cherokee, Clarke, Clay, Clinch, Cobb, Coffee, Columbia, Coweta, Crawford, Dade, Decatur, De Kalb, Dooly, Dougherty, Early, Effingham, Elbert, Emanuel, Fannin, Fayette, Floyd, Forsyth, Franklin, Fulton, Gilmer,

Glynn, Gordon, Greene, Gwinnett, Habersham, Hall, Hancock, Harris, Hart, Hayne, Heard, Henry, Houston, Irwin, Jackson, Jasper, Jefferson, Jones, Kinchafonee, Laurens, Lee, Liberty, Lincoln, Lowndes, Lumpkin, Macon, McIntosh, Madison, Marion, Mariwether, Monroe, Montgomery, Morgan, Murray, Muscogee, Newton, Oglethorpe, Paulding, Pickens, Pike, Polk, Putnam, Rabun, Randolph, Richmond, Scriven, Spalding, Stewart, Sumter, Talbot, Taliaferro, Tatnall, Taylor, Telfair, Thomas, Troup, Twiggs, Union, Upson, Walker, Walton, Ware, Warren, Washington, Wayne, Whitefield, Wilkes, Wilkinson, Worth.—Savannah, on the river of the same name, 18 m. from the sea, is the chief commercial and largest city of the state, and one of the principal ports for cotton, rice, and lumber on the S. E. Atlantic coast. Milledgeville, at the head of navigation of the Oconee river, is the seat of the state government. Darien, on the N. bank of the Altamaha, near its mouth; Brunswick, with a fine harbor, 20 m. further S.; and St. Mary's, on the N. bank of St. Mary's river, are other chief ports, and are largely engaged in the coasting trade. They are visited by the Florida steamships on their trips to and from Savannah and Charleston. Augusta, on the Savannah river, ranks as the second city of the state both in relation to its population and commerce; and Columbus, on the Chattahoochee, as the third. Both are frontier cities. Macon is the largest interior city. Atlanta, Griffin, Rome, &c., are also important places. Athens, Oxford, Milledgeville, Macon, and Penfield are seats of colleges. Dahlonega is the seat of a branch of the U. S. mint. —The population of Georgia in 1790 and at subsequent decennial periods, and also in 1852, was as follows:

U. S. census.	White.	Free color'd.	Slave.	Total.
1790.....	52,886	898	29,364	83,148
1800.....	101,678	1,019	59,404	162,101
1810.....	145,414	1,801	105,218	252,433
1820.....	189,564	1,767	149,666	341,937
1830.....	294,906	2,484	217,581	514,971
1840.....	407,895	2,758	280,944	691,597
1850.....	551,573	2,981	381,683	936,137
State census.				
1852.....	542,567	2,266	389,237	934,070

1, slaves 148. Births (white and free colored), 15,239; marriages, 4,977; deaths, 4,592; total deaths (including slaves), 9,928. Of the total population, 527,174 were under 20 years of age, 367,711 between 20 and 70, 10,826 between 70 and 100, 221 over 100, and 248 unknown. Of 595 between 90 and 100, 268 were whites, 23 free colored, and 804 slaves; and of those over 100, 55 were whites, 6 free colored, and 160 slaves. Of the total free population (524,503), there were 402,666 natives of the state, 115,418 natives of other states, 5,907 foreigners, and 517 of origin not ascertained; there were 122,954 Georgians resident in other states of the Union. Of 123,243 males (white and free colored) over 15 years of age, 20,715 were engaged in commerce, trade, manufactures, mechanic arts, and mining; 8,862 in agriculture; 11,505 in labor not agricultural; 18 in the army; 289 in sea and river navigation; 2,815 in law, medicine, and divinity; 8,942 in other pursuits requiring education; 416 in government civil service; and 178 in other pursuits. Slaveholders 88,456, viz.: holders of 1 slave, 6,554; of 1 and under 5, 11,716; of 5 and under 10, 7,701; of 10 and under 20, 6,490; of 20 and under 50, 5,056; of 50 and under 100, 764; of 100 and under 200, 147; of 200 and under 300, 22; of 300 and under 500, 4; of 500 and under 1,000, 2. Paupers supported during the year (1849-50), 1,086, costing \$27,820; criminals convicted, 80; convicts in prison (June 1, 1850), 89, all whites. Federal representative population (all free and  $\frac{3}{4}$  of the slaves), 677,176, which number entitles the state to 8 representatives in the national congress.—The Savannah, the largest river of Georgia, and the boundary toward South Carolina, rises by two head streams, the Tugaloo and Keowee, in the Appalachian chain, and near the sources of the Tennessee and Hiwassee on the one side and of the Chattahoochee on the other. From the junction of these confluent at Andersonville (lat. 34° 28'), the river has a S. S. E. course of 450 m. to the sea, which it meets near lat. 32° and long. 81°. It is navigable for large ships to Savannah, 18 m., and for steamboats of 150 tons to Augusta, 280 m. further; and by means of a canal round the falls navigation for small steamboats is prolonged for 150 m. above. The Chattahoochee rises near the W. constituent of the Savannah, pursues at first a S. W. course, but at West Point (lat. 32° 52') on the Alabama line turns S. and enters Florida (lat. 30° 41') under the name of the Appalachicola. Its whole length to the gulf is about 550 m., and steamboats ascend it 850 m. to the falls at Columbus. Flint river rises in the hilly country S. of the Chattahoochee, and joins that river in the S. W. corner of the state after a course of 300 m.; it is navigable for steamboats to Albany. The Ochlockonnee, Withlacoochee, and Allapaha drain the S. section of the state, and pass through Florida to the gulf of Mexico. The Withlacoochee and Allapaha by their junction in Florida form the Suwannee. Next to the Savannah, the Altamaha is the largest river

According to the tax books of 1856, there were 105,750 polls, and 416,785 slaves valued at \$210,538,634. Of the white population in 1850, there were 266,233 males and 255,839 females; of the free colored (1,403 blacks and 1,528 mulattoes), 1,875 males and 1,556 females; and of the slave (359,013 blacks and 22,669 mulattoes), 188,857 males and 192,825 females. The density of population in the same year was 15.63 to the square mile, and the proportion to the whole population of the Union 3.48 per cent. The white and free colored occupied 91,206 dwellings, and constituted 91,666 families. Deaf and dumb, 286: white 208, free colored 1, slaves 87; blind, 357: white 224, free colored 4, slaves 129; insane, 324: white 294, free colored 2, slaves 28; idiotic, 664: white 515, free colored

falling into the Atlantic. It is formed by the junction of the Oconee and Ocmulgee, which rise in the hilly region S. of the Chattahoochee and flow for about 250 m. nearly parallel to each other, when the latter bends to the E. and unites its waters with those of the former. The main river is navigable for sea-going vessels to Darien, and steamboats ascend the Ocmulgee to Macon and the Oconee to Milledgeville. The Ogeechee drains the country between the Savannah and Altamaha, and has a S. E. course of 200 m., with 80 or 40 m. of sloop navigation; its southern branch, the Cannouchee, is navigable for 50 m. The Santilla and St. Mary's drain the S. E. section of the state; both are navigable for sloops about 40 m., and for boats much further; the St. Mary's forms the boundary toward Florida. The N. and N. W. sections of the state are drained by the Tacooah, the Notley, and other tributaries of the Hiawassee; and by the Oostenaula and Etowah, which, uniting at Rome, form the Coosa, one of the tributaries of the Alabama. The Tallapoosa, also a tributary of the Alabama, has its sources in this state between the Coosa and Chattahoochee.—The coast of Georgia extends in a S. S. W. direction from Tybee sound to Cumberland sound, a distance of 128 m., with a shore line estimated at 480 m. Though generally uniform as to course, it is very irregularly indented, and is skirted by numerous low islands which extend parallel to the shores. The principal of these from N. to S. are Cabbage, Ossabaw, St. Catharine's, Sapelo, St. Simon's, Jekyll, and Cumberland. The islands as well as some tracts on the adjacent main have a light sandy soil, well adapted to the cultivation of cotton. The cotton grown here is the long staple, or, as it is called from the place of its growth, "sea-island cotton." The inlets and sounds which divide the islands from one another and from the mainland are generally navigable, but too shoal to admit vessels of more than 100 tons. Vessels of larger dimensions can enter only 4 harbors, viz: Savannah, Darien, Brunswick, and St. Mary's. The bar of the Tybee entrance of the Savannah has 19 feet water; that of the Sapelo entrance of the Altamaha, 14 feet; that of St. Simon's sound (entrance of Brunswick harbor), 17 feet; and that of St. Mary's river 14 feet. These figures represent the least water in the channel ways at low water of mean tides; the mean rise of tides on this part of the coast varies from 7 feet in the Savannah to 5.9 feet in the St. Mary's.—Georgia is naturally divided into two regions distinguished by their topography, geological structure, climate, and vegetable productions. The line of the first falls met with in ascending the streams marks here, as well as further N., the ascent upon the platform of granitic and palæozoic rocks, which stretches on to the Appalachian mountains. This line crosses the central portion of the state from Augusta on the Savannah, by Macon on the Ocmulgee, to Columbus on the Chattahoochee. It is nearly parallel with the range of the Alleghanies, that cross in a N. E. and

S. W. direction the northern portion of the state; but it is so distant from these mountains that the intervening hilly region of the metamorphic and lower silurian rocks is here much broader than elsewhere along the eastern slopes of the Alleghanies. The width of the belt is not far from 150 miles. On the S. it is succeeded immediately by the lowest tertiary, the eocene, whose sands, clays, calcareous and silicious strata, are seen reposing upon the ancient metamorphic slates and gneiss along the line of contact with these. The cretaceous formation only intervenes from a point almost in the centre of the state, near Macon, gradually widening in its outspread toward the W., and pushing the outcrop of the overlying eocene further to the S. The cretaceous group is also seen at a few isolated points rising through the tertiary near the Ogeechee river. S. of the line designated above, the whole country toward the gulf of Mexico and the Atlantic ocean is occupied by the eocene and the modern tertiaries of the coast; a belt wider even than that of the ancient formations of the N. half of the state. These two districts are often designated as upper and lower Georgia. The latter near the ocean and the Florida line is low and swampy, its better portions well adapted for the culture of rice; but these spots are uninhabitable by whites during the sickly season, whose refuge is then to the dunes, called the sand hills, that occur near the coast in parallel ranges of 40 or 50 feet elevation, or to the more salubrious climate of the "up country." The growth along the banks of the streams is of canes, cypress, *magnolia glauca* and *grandiflora*, gum of different species, including the liquidamber tree, oaks, tulip, ash, sweet bay, and many other genera; while back upon the sandy lands pines and scrub oaks are almost the only trees. Several species of palmetto give a tropical aspect to the low islands along the coast, and the magnificent live oaks largely obtained in the vicinity of Brunswick furnish the most valuable ship timber grown in the United States. In the alluvium, which attains an elevation of only a few feet above the water, skeletons of the mastodon, mylodon, megatherium, an extinct species of elephant, and of the ox, are found; and beneath the muddy peaty soil in which they lie the sands and clays are of the post-tertiary formation, containing fossil shells, all of the same species that now live in the neighboring salt water. This formation extends 20 m. inland, the surface rarely exceeding 40 feet elevation above the sea, and averaging from 10 to 12 feet. Here the land suddenly rises by a terrace 70 feet higher, and this table-land continues nearly level about 20 m. further inland, when another terrace of about 70 feet higher rise leads to a third level tract. These steps are described by Bartram in his "Travels through North and South Carolina, Georgia, &c." (London, 1792); and their occurrence is confirmed, together with many other phenomena noticed by this traveller, by Lyell in his "Second Visit to the United States." These platforms have

distinct botanical characters, the prevailing forest trees as well as the smaller plants being different in each. The upper eocene table continues to ascend toward the N., till at Milledgeville, where it meets the metamorphic gneiss, the elevation is about 575 feet above the sea. The distance to the ocean is about 200 miles. Such a surface is admirably adapted for the location of a railroad; but the soil is poor and sandy, and forests of pine cover a large portion of the country. From the central portion of the state the surface of the country becomes more elevated, the hills increase in size toward the N., and the rivers descend more swiftly as they are traced toward their sources. The southern spurs of the Appalachians are reached in the Etowah hills of Carr and Cherokee counties, and the Arnicolola hills of Gilmer and Lumpkin; and the Blue Ridge, ranging with these between Lumpkin and Habersham on the S. and Union co. on the N., constitutes the great water-shed that directs the streams on one side toward the Atlantic and on the other toward the Mississippi. In Cass co. the limestones of the lower silurian are met with just N. of the Etowah river, and the formation extends toward Tennessee, till in the N. E. corner of the state it is overlaid by later members of the palaeozoic rocks, which finally are capped by the coal formation. Near the junction of the limestone with the metamorphic rocks immense deposits of iron ore are found, in the latter ranging N. E. from the S. E. corner of Cass through Cherokee. (See IRON.) Gold occurs in almost every county N. of the central line through the state, as will be noticed in the article GOLD. The copper veins worked in Polk co., Tenn., are traced across the line into Gilmer co. (See COPPER.) The other mineral productions of the state, except the limestones, and in the eocene region the marls and buhrstone of this formation, are of little importance.—The climate varies with the latitude, corresponding to that of adjoining regions in the neighboring states already described. The northern section of the state is a grain region, little or no cotton being grown in the mountain counties.—In 1850 there were in Georgia 22,821,879 acres of land occupied for farming purposes, and of this 6,378,479 acres were improved. This is about  $\frac{1}{2}$  of the whole area. There were 51,759 farms and plantations, averaging 441 acres, and together valued at \$95,753,445. Value of farming implements and machinery, \$5,894,150. There were 14,873 cotton plantations, and 80 rice plantations, each raising 20,000 lbs. and over. Live stock: horses 151,331, asses and mules 57,379, milch cows 334,228, working oxen 73,286, other cattle 690,019, sheep 560,435, swine 2,168,617. Value of live stock, \$25,728,416, and of animals slaughtered in the year, \$6,839,762. Products in 1850: wheat 1,088,534 bushels, rye 53,750, oats 3,820,044, Indian corn 30,080,099, barley 11,501, buckwheat 250; potatoes, Irish, 227,379 bushels, and sweet 6,986,428; hay 23,449 tons; hops 261 lbs.; clover seed 132, and other

grass seeds 428 bushels; butter 4,640,559, and cheese 46,976 lbs.; peas and beans 1,142,011 bushels; produce of market gardens \$76,500, and orchard products \$92,176; beeswax and honey 732,514 lbs.; home-made manufactures \$1,838,968; flax seed 622 bushels; flax 5,387 lbs.; maple sugar 50 lbs.; cane sugar 446,000 lbs.; molasses 216,245 galls.; ginned cotton 499,091 bales of 400 lbs., rough 38,950,691 lbs.; tobacco 423,924 lbs.; wool 990,019 lbs.; silk cocoons 818 lbs.; wine 796 galls. Total value of agricultural products in 1840, \$29,612,436, and in 1850, \$46,686,151. Average crops (bushels) per acre: wheat 5, rye 7, corn 16, oats 18, cotton seed 500, peas and beans 5, potatoes, Irish, 125, sweet, 400. Manufacturing establishments 1,527; capital \$5,460,433; raw material \$3,404,917; hands—male 6,660, female 1,718; annual wages \$1,712,304; annual products \$7,086,525; profit 36.06 per cent. Cotton factories 35, capital \$1,736,156, cotton used 20,230 bales, products \$2,185,044. Woolen factories 3, capital \$68,000, wool used 153,816 lbs., products \$88,750. Iron works: pig 3, capital \$26,000, products \$57,300; castings 4, capital \$35,000, products \$46,200; wrought 3, capital \$9,200, products \$12,384. Distilleries and breweries 8, capital \$9,230, products 60,450 galls. whiskey and high wines. In 1810 the value of manufactured products was \$2,768,904; and in 1840, \$3,856,677. The exports from Georgia for the year ending June 30, 1858, were valued at \$9,597,559 (all domestic produce)—in American vessels \$7,958,710, and in foreign vessels \$1,638,849; and the imports at \$411,650—in American vessels \$332,740, and in foreign vessels \$78,910. Tonnage: outward, 99,156 (71,631 American and 27,525 foreign), and inward 69,993 (44,378 American and 25,615 foreign). Of the tonnage cleared, 88,050 was at Savannah, 6,476 at Brunswick, 4,680 at St. Mary's; and of that entered 60,048 at Savannah, 1,366 at Brunswick, 2,579 at St. Mary's. Shipping owned: Savannah 37,239, Brunswick 611, St. Mary's 1,745; total, 39,595 tons. Shipping built in the year, 615 tons. In 1821 Georgia exported \$6,014,810; in 1826, \$4,368,504; in 1831, \$3,959,818; in 1836, \$10,722,200; in 1841, \$8,696,513; in 1846, \$2,708,033; in 1851, \$9,159,989; in 1856, \$3,091,688; in 1857, \$10,857,634. Imports in 1821, \$1,002,684; in 1826, \$330,993; in 1831, \$399,940; in 1836, \$578,222; in 1841, \$449,007; in 1846, \$205,495; in 1851, \$721,547; in 1856, \$574,240; in 1857, \$779,909. These figures, however, do not represent the whole commerce of the state, as the great bulk of its cotton, rice, &c., is carried coastwise to the northern ports, and to a considerable extent finds an outlet through Charleston and the ports of Florida. Its imports are also chiefly coastwise.—On Jan. 1, 1858, Georgia had 33 banks and 84 branch banks, with a capital of \$10,711,190; specie, \$1,500,000; circulation, \$5,000,000.—The subjoined table exhibits the extent and cost of the railroads of Georgia as officially returned in 1858:

Names of railroads.	Terminal.	Miles.		Capital paid in.	Debt, funded and floating.	Cost of road and equipment.
		In operation.	Under construction.			
Atlanta and La Grange.....	Atlanta..... West Point.	88½	..	\$1,000,000	\$196,000	\$1,171,700
Augusta and Savannah.....	Augusta..... Millen.	58	..	788,700	.....	1,098,100
Barnesville and Thomaston.....	Barnesville..... Thomaston.	16	..	.....	.....	200,000
Brunswick and Florida.....	Brunswick..... Junc. Main Trunk.	81	27	151,887	463,648	683,543
Central.....	Savannah..... Macon.	191	..	3,750,000	.....	3,750,000
Etowah.....	Etowah..... Junc. W. and Atl. railroad.	9	..	.....	.....	112,500
Georgia.....	Augusta..... Atlanta.	171	..	4,156,000	476,395	4,174,495
Athens branch.....	Union Point..... Athens.	89	..			
Warrenton branch.....	Camak..... Warrenton.	4	..			
Washington branch.....	Cumming..... Washington.	18	..	1,438,560	96,000	1,500,000
Macon and Western.....	Macon..... Atlanta.	102½	..			
Main Trunk.....	Initial Point..... State line.	8½	151			
Milledgeville and Gordon.....	Milledgeville..... Gordon.	17½	..	.....	.....	212,500
Milledgeville and Eatonton.....	Milledgeville..... Eatonton.	29	..	.....	.....	275,000
Muscogee.....	Butler..... Columbus.	50	..	669,500	249,000	981,213
Rome and Kingston.....	Rome..... Kingston.	20	..	.....	.....	250,000
Savannah, Albany, and Gulf.....	Savannah..... Initial Point.	68	..	1,000,000	178,874	1,151,330
South-western.....	Macon..... Albany.	106	..	2,254,000	661,000	2,985,000
Butler branch.....	Fort Valley..... Columbus.	22	..			
Outhbert branch.....	Smithville..... Outhbert.	34½	44			
Western and Atlantic.....	Atlanta..... Chattanooga, Tenn.	188	..	4,495,652	90,000	5,901,497

This gives a total of 1,208 m. in operation and 218 m. under construction. To the total in operation must be added a portion (about 15 m.) of the East Tennessee and Georgia railroad, which lies within this state, and deducted therefrom 18½ m. of the Western and Atlantic railroad, which extends into Tennessee. A railroad was chartered in 1857 to extend from Macon to Brunswick, 174 m., and another is projected to connect Savannah with the Florida and Cedar Keys railroad. With the exception of the Atlantic and Western, which was built at the expense of the state and passes through a rugged country, the railroads of Georgia have been constructed at a comparatively small cost, and have invariably been successful, paying from 8 to 10 per cent. annually on the capital invested in their construction. The canals of this state have been constructed for local convenience: that around the falls of the Savannah, at Augusta, is 9 m. long; another (16 m.) connects the Savannah and Ogeechee rivers, and another (12 m.) connects Brunswick and the Altamaha, making a total length of 87 m. The total length of mail route in this state on June 30, 1858, was 10,871 m., of which 1,172 m. was railroad, 1,979 m. steam navigation, 1,278 m. coach, and 5,947 m. not specified. All the chief towns are connected by telegraph. The census of 1850 presents the following statistics regarding churches:

Denominations.	Churches.	Accommodations for	Value of property.
Baptist.....	579	821,688	\$390,801
Christian.....	5	1,710	12,050
Congregational.....	1	250	2,700
Episcopalian.....	20	9,825	109,910
Free.....	6	1,780	2,650
Friends.....	2	500	400
Lutheran.....	8	2,825	84,850
Methodist.....	809	240,688	398,948
Moravian.....	1	75	25
Presbyterian.....	97	40,506	218,905
Roman Catholic.....	8	4,250	79,500
Union.....	16	7,350	21,100
Universalist.....	8	900	1,000
Minor sects.....	7	1,275	1,625
Total.....	1,822	622,992	\$1,360,850

There were 19 colleges, with 84 teachers and 1,525 students, and an annual income from endowment of \$21,720, public funds \$500, other sources \$38,210, total \$105,430; 219 academies and private schools, with 318 teachers, 9,059 pupils, and an annual income from endowment of \$7,897, public funds \$200, other sources \$101,386, total \$108,983; 1,251 public and primary schools, with 1,265 teachers, 82,795 pupils, and an annual income from endowment of \$500, taxation \$21,520, public funds \$16,959, other sources \$143,252, total \$182,231. Total number of children at school, 43,299; total number as returned by families, 77,016, of whom 42,366 were males, and 34,650 females; adults over 20 years of age unable to read and write, 41,667. There is no common school system in this state. Gov. Johnson, in his inaugural message of Nov. 1857, however, recommended a plan to the legislature. The amount of the school fund owned by this state in 1853 was \$28,086. The poor school fund is distributed among the several counties, and is paid out to teachers of schools and academies ratably, regulated by the report of the magistrates of each district. The amount appropriated by the state for 1856 was \$36,286. The following table gives the principal collegiate and professional schools, with their statistics for Jan. 1858:

Institutions.	Founded.	Inst'ns.	Students.	Vols. in library.
Franklin college, Athens.....	1785	10	160	18,990
Oglethorpe university, Milledgeville.....	1888	5	97	4,500
Emory college, Oxford.....	1887	6	126	1,700
Mercer university, Penfield.....	1888	8	89	7,500
Wesleyan female college, Macon.....	1889	9	150	1,800
Theological sem. of Mercer university.....	1844	2	10	2,500
Medical college of Georgia, Augusta.....	1890	7	115	....

In 1850 there were 51 newspapers and periodicals (5 daily, 3 tri-weekly, 37 weekly, and 6 semi-monthly), circulating 67,484 copies, or annually 1,411,976; of these, 18 were literary and miscellaneous, 6 neutral and independent, 20 political, 3 religious, and 4 scientific. The

public institutions supported by the state are the state prison at Milledgeville, and a lunatic asylum at Midway, near the capital. The state appropriates annually \$15,000 to this asylum, and the legislature of 1853 appropriated \$25,000 to enlarge and improve the buildings. The state has also an institution in Murray co. for the education of the deaf and dumb, and the blind.—The government of Georgia is based on the constitution of 1798 and amendments thereto. The right to vote is granted to every resident citizen 21 years of age, who has paid all taxes demanded for the year, and resided in the county for the 6 months preceding. Votes are given *visa voce*. The general elections are held on the 1st Monday in October biennially. The general assembly consists of a senate of 112 members and a house of representatives of 150 members, elected for 2 years. The pay of members is \$5 per diem. All revenue bills must originate in the house, and the governor's veto to any bill passed by the two houses may be nullified by a subsequent two-thirds vote. Sessions are biennial, and commence on the 1st Monday in November (odd years). The governor is elected by popular vote for 2 years, and has a salary of \$3,000 per annum. He must be 30 years of age, have been a citizen of the United States for 12 and of the state for 6 years, and be possessed of a freehold of 500 acres, or other property worth \$4,000. In case of vacancy, the office is filled by the secretary of state, and failing him, by the speaker of the house. The chief administrative officers, viz., the secretary of state, treasurer, comptroller-general, and surveyor-general, are elected for 2 years by the legislature on joint ballot, and have each \$1,600 per annum. The president of the senate and speaker of the house have each \$8 per diem. The judiciary consists of a supreme court, circuit courts, &c. The supreme court consists of 3 judges (salary \$2,500 per annum), who are elected for 6 years (one every 2 years) by the general assembly, a clerk, and a reporter. This is the highest court of appeal. Judges of circuit courts (salary \$1,800) are elected for 4 years by the people, one in each of the 16 circuits into which the state is divided. These courts have exclusive criminal and concurrent civil jurisdiction. Ordinaries or judges of probate are elected in each county, and justices of the peace in districts for 4 years. Savannah and Augusta have each a separate court of oyer and terminer, the judges of which have \$1,000 per annum.—The resources of the state treasury for the year ending Oct. 20, 1858, amounted to \$1,201,899, viz.: balance from 1857, \$437,826; earnings of W. and Atlantic railroad, \$200,000; receipts from all other sources, \$563,578. The disbursements for the same term amounted to \$745,480, viz.: on account of civil establishment, \$57,141; legislature (biennially) of 1857, \$114,242; public printing, \$20,164; lunatic asylum, building, &c., \$83,712; academy for the blind, building, &c., \$19,500; special appropriations, \$72,098; public debt, interest, &c.,

\$202,798; miscellaneous, \$175,889. The public debt consists chiefly of bonds issued for the construction of the Western and Atlantic railroad; it amounted on Oct. 20, 1858, to \$2,632,722. The semi-annual interest as well as the principal of the sterling bonds are payable in London; the interest on the remainder of the debt, nearly  $\frac{1}{2}$ , is payable in New York or Georgia as the holders may prefer. The debt is redeemable from 1863 to 1874. The productive property owned by the state consists of the Western and Atlantic railroad, which cost about \$5,000,000, and is estimated to be worth that sum. The state also owns productive property to the amount of \$250,000. The valuation of taxable property in 1850 was returned at \$385,116,225, in 1855 at \$528,927,963, and in 1858 at \$589,055,114.—Of the 13 provinces which declared themselves independent in 1776, Georgia was the latest settled. The country lying within its present boundaries was previous to 1733 a wilderness, and, though comprehended within the charter of Carolina, had been claimed by Spain as well as England. By patent dated June 9, 1732, George II., in honor of whom it received its name, granted the territory to a corporation entitled the "Trustees for settling the Colony of Georgia." The double purpose proposed in the settlement of this region was, on the one hand, to afford a retreat for the destitute at home, and on the other, to secure the frontiers of the Carolinas from the incursions of the Indians and the Spaniards of Florida. In November of the same year 120 persons were embarked at Gravesend under the direction of Gen. James Oglethorpe, and arrived at Charleston in Jan. 1733. From this place Oglethorpe proceeded to explore the country, and soon after purchased a large tract of land from the Creeks. On a high bluff overlooking a river the foundation of a town was laid, which received the name of Savannah. Here the settlement was commenced in the spring of 1733; but the injudicious system pursued by the trustees, and perhaps the character of the settlers themselves, impeded a rapid advance. The condition upon which the lands were parcelled out was military duty, and so grievous were the restrictions to which the colonists had to submit that many returned into Carolina, where the lands were held in fee simple. The number of inhabitants in the colony nevertheless continued to increase. In 1734 about 600 immigrants arrived out, but were principally of that class which poverty had rendered idle and dissolute. The trustees now changed their land policy, and offered 50 acres to each settler. In consequence of this regulation, the colony soon after received considerable accessions to its population, chiefly from Germany and Scotland. At this juncture, in 1739, war broke out between Spain and England, and Gen. Oglethorpe was appointed to the command of the South Carolina and Georgia troops. Having mustered 1,000 men and a number of Indian allies, he invaded Florida, but failing in an expedition

against St. Augustine, returned unsuccessful. In 1742 this invasion was retaliated, and a Spanish fleet of 86 ships and 3,000 men appeared in the Altamaha river, took Fort St. Simon, and were proceeding against Fort Frederica, on St. Simon's island, when by a stratagem conceived by Oglethorpe they became alarmed, retired to their ships, and sailed for Florida. Peace was soon after restored; but though the colony was freed from one source of disquiet, the condition of its affairs was not satisfactory. Restrictions of various kinds, and especially the prohibition of slavery, rendered the people discontented, and many abandoned their settlements, while those who remained with difficulty obtained a scanty subsistence. The complaints arising from their mismanagement at last induced the trustees to surrender their charter to the crown, and in 1752 Georgia became a royal government, with the same privileges and regulations as to land and trade and negro slaves that prevailed in the other colonies. The first good effect of the change of government was felt in the establishment of a general assembly in 1755. The limits of the colony to this time were the Savannah on the N. and the Altamaha on the S., extending westward to the Pacific. In 1763 all the lands lying between the Altamaha and St. Mary's were annexed to Georgia by a royal proclamation. From this period the colony began to make rapid progress; the rich swamps and lowlands on the rivers were brought into cultivation, and production so rapidly increased that the exports had risen from £3,059 in 1753 to £14,469 in 1763, and in 1773 they amounted to £85,891; in the same years the imports were valued at £14,128, £44,908, and £62,932. The population in 1775 was about 75,000, or more than 8 times its amount in 1752; and in this, its last year of colonial dependence, its exports were valued at £103,477, and its imports at £113,777. Thus at the commencement of the American revolution Georgia had just begun to enjoy the blessings of peace and of a more beneficent system of government. Notwithstanding these motives for continuing in connection with England, the colonists did not hesitate to make the grievances of their northern brethren their own, and take part in the coming struggle. In March, 1775, they appointed a delegate to congress; and in July of the same year a convention assembled and gave the sanction of the colony to the measures of congress. During the war that ensued Georgia was overrun by British troops, and the principal inhabitants were compelled to abandon their homes and fly into the neighboring states. In 1778 Savannah was captured, and in 1779 Augusta and Sunbury. In the latter year an unsuccessful attempt was made by the Americans and French to recapture Savannah. Georgia framed its first constitution in 1777, and a second one in 1785. The present constitution of the state is the third, having been adopted in 1793, but since that date it has undergone several amendments. The constitution of the United States was ratified by Georgia on Jan.

2, 1788. After the close of the revolutionary war Georgia suffered on her frontiers from the incursions of the Creeks and Cherokees. In 1790 and 1791 treaties were concluded with the chiefs of those nations by which the boundaries of the state were established. By the treaty of Fort Wilkinson in 1802 the Creeks ceded a large tract of land to the United States, which has since been assigned to Georgia, and now forms the S. W. counties of the state. In the same year Georgia ceded to the United States all its claims to the lands westward of its present limits, and which now form the flourishing states of Alabama and Mississippi. The subsequent intervention of Georgia in that portion of the ceded territory occupied by the Cherokees occasioned serious difficulty between the state and the national government, but was at length successful in 1838 in causing the removal of the Cherokees to the Indian territory, when Georgia came into possession of their long-coveted lands.

GEORGIA (Rus. *Grusia*; anc. *Iberia*), a country of Asia, on the S. declivity of the Caucasus, for more than 2,000 years a separate kingdom, with frequently changing governments, boundaries, and divisions, sometimes independent, and sometimes tributary to the Persians, Arabs, Tartars, &c. It was annexed to Russia in 1801, and now forms part of the Russian government of Tiflis, bounded N. by the Caucasian mountains, W. by a branch of that range, and S. and E. by Armenia and Shirvan; area, about 25,000 sq. m.; pop. about 300,000. The surface is in general mountainous, but the valleys, especially that of the river Kur, which occupies the centre of the province, are of great fertility. The climate is healthful and agreeable. The principal productions are corn, fruit, wine, hemp, flax, silk, and cotton. The inhabitants, like the other Caucasians, are distinguished for beauty of form and feature, and both sexes are highly esteemed and eagerly sought after by the Turks—the men for their armies, and the women for their harems. The sale of their serfs for these purposes long constituted the Georgian nobles' main source of revenue; but since the country passed under the sovereignty of Russia this traffic has been interdicted, and the relations between the different classes of society considerably modified and improved. The Georgians are members of the Greek church, and have had the Bible in their vernacular tongue since the beginning of the 10th century; but both priests and people are generally ignorant. Capital, Tiflis. The term Georgia is often, but incorrectly, applied to all the Trans-Caucasian possessions of Russia. Lady Sheil, in her "Glimpses of Life and Manners in Persia" (London, 1856), says of the Georgian women: "They certainly are fair, with high complexions, natural or artificial, and regular features, all of which perhaps entitle the women to the meed of beauty; still the entire absence of animation or expression deprives the countenance of attraction. They look well,

however, in their pretty dresses, while young." She further remarks: "Next to its conquerors, the Georgians are the master caste of this country. It is said that between the Georgians and the Armenians, who are found here in great numbers, there is a wonderful contrast in character and manners. The Georgian is bold, turbulent, reckless, extravagant; the Armenian is mean, cringing, timid, always intent on gain, and unlike a Georgian in keeping what he gains. It is as unsurpassable topers, as well as for their military qualities, which have always been acknowledged, that the Georgians have acquired notoriety. At their frequent drinking parties it is said they will pass several days and nights, almost without intermission, in quaffing the productions of the vineyards of Kakheti, a district in the mountains E. of Tiflis. This wine is by no means of bad quality. It is of a deep red color, so deep that one fancies it has been tinged with some dye to produce so intense a hue. They are said to consume incredible quantities of wine on these occasions. The drinking vessel is a cow's horn of considerable length, and the point of honor is to drain it at a draught."

GEORGIA, GULF OF, an arm of the sea lying between Vancouver island and the mainland of British Columbia, between lat. 48° 50' and 50° N., and long. 122° 40' and 125° W. On the S. it is connected with the strait of Juan de Fuca, and on the N. with Queen Charlotte sound. Howe sound and Jervis and Burrard inlets run from it into the mainland. Fraser river flows into it. Its length is about 100 m., and its greatest breadth 30. At each extremity of the gulf is an archipelago of islands, and it contains several large islands, the principal of which are Texada, Savary, Harwood, and Llasqueti.

GEORGIAN LANGUAGE AND LITERATURE. The people (about 600,000) who speak the Georgian language call themselves Karthveli, but are also named Grusini, and inhabit S. and S. W. of the Caucasus, the valley of the upper and middle Kur, those of the Rion and Tchoruk, as far as the promontories of the Ararat chain, and N. E. to the Alazan, beyond which their language is mixed with the tongues of Shirvan and Daghestan, as far as the Caspian sea. Probably descendants of the Colchi and Albani, they were anciently called Iberi, and, according to tradition, are akin to the Armenians, although their language differs from the Haikanian (*Somasi* in Georgian), and is believed by their learned prince Theimuraz to be primitive. Brosset and Voës (1847) place it among the Indo-European languages. It consists of several dialects, viz.: the Karthveli or Georgian proper in the centre, the Kakheti and Imerethi next, then the Mingreli and Guri, and more remotely the Suani and the Lazi, which reaches almost to Trebizond. A colony transported into Asterabad in Persia in 1622 is said to speak a purer idiom than any of those now spoken in Georgia. The *anbangan*, or alphabet, has 8

forms, viz.: the *Khutsuri* or priestly, containing both capital and small *asgni* or letters, attributed by some to Pharnavaz, the first king, who expelled the viceroy of Alexander the Great, but more probably contrived by St. Mesrob, who made the Haikan *Aibbengim* or Armenian alphabet, during the reign of Artchil (A. D. 413-24); and the *Mkhedruli Kheli*, or soldier's hand, dating from 1812, when the Georgian calendar was reformed. The catholicoi or patriarch Antoni, of royal race, enriched the alphabet in his grammar (1667). It contains 8 vowels (*a, e, i, o, u, ä, ü, üi*) and 30 consonants. Of these 6 are guttural, *g, k, gh, ch, kh, h* (2); 5 labial, *b, p, f, ph, v*; 18 dental, *d, t, s, z, th, French j, sh, ds, ds, ts, dah, dah, tch*; 5 liquid, *l, m, n, r* (2). In shape it resembles the Zend letters. Beside these, about 160 contracted groups of letters are also in use. The language is very harsh and hissing, but very expressive. Its syntax has little analogy with that of other languages. Several grammatical forms are like those of the Sanscrit. It has no article and no genders. There are 8 cases of declension, viz.: nominative, ending in *i*; genitive, in *a, isa, esa*; dative, *sa*; accusative, same as the nominative; vocative, *o*; instrumental, *itha*; ablative, *sagan* (vulgarly *ida, idam*); demonstrative, *man*, with some variations. A locative case ending in *mde*, and a modal case in *d*, are also found. The plural marks, inserted between the stem and these endings, are *eb* and *n*. We give some specimens with equivalents in Latin: *puri*, panis; *khiboisa*, cancri; *uremea*, curru; *khoni*, baculum; *thavo* / o caput; *khilitha*, fructus ope (instrumental); *sakdrisagan*, a throno; *vardiman*, en rosam; *purebisagan*, a panibus; *khilebisamde*, in fructibus, &c. The pronouns are: *me*, I; *tehen*, thou; *tkhoni*, you; *teheni*, my; *ehen*, thy, &c. Numerals: 1, *orhi*; 2, *ori*; 3, *sami*; 4, *othkhi*; 5, *khuthi*; 6, *ekusi*; 7, *shvidi*; 8, *rea*; 9, *tskhra*; 10, *athi*, &c. The ordinals are the same, with *me* prefixed. There are 8 conjugations of verbs, with many variations, both by prefixes (1st person *v*, 2d and 3d *h*) and by personal endings. Many verbs have inseparable prepositions. The construction is very free, e. g.:

*Radethi khelidam romliman khnnee teddadi*  
Whereas every-one who makes (commits) sin,  
*mna ara igi teddida.*  
self is he sin-of.

*Mamdo teheni romli khar tetta shna, &c.*  
Father our who art heaven in

—Notwithstanding the terrible devastations of Georgia by the Seljukian Osmanlis in the 11th century, by Batu Khan in 1234, by the Turks in 1552, &c., and the frequent change of masters, its princes distinguished themselves by a liberal patronage of men of letters. The dynasty of the Bagratides especially gave a great impulse in the 18th century to the development of the language, of poetry, and of the sciences. Theimuraz I., Artchil, Wakhtang VI. (who published the emperor Leo's, the Armenian, and his own laws), Sulkhan-Saba, Bakar, and many



other princes and princesses, rank among the most conspicuous Grusinian writers. The Georgian literature is mostly founded on that of Greece. The Bible was partly translated in the 8th century, finished in the 18th, and splendidly printed at Moscow, Tiflis, and St. Petersburg. Arabic and European works have also been translated into Georgian. We can mention but a few of the many remarkable national works. Among the romances are the following: *Tariel* (Of the Man in the Tiger Skin), by Skhotta of Rusthvel, a general of the heroic queen Tamar, with a commentary by King Wakhtang VI. (Tiflis, 1798); *Daredjamiani* (Deeds of Amiran, son of Daredjan, a hero of Bagdad), by the courtier Moses of Khoni; *Viramiani* (Love of the princess Vis for Prince Ramin), somewhat resembling Rousseau's *Héloïse*; *Miriani* (story of the Chinese princess Miri), imitated from the Persian. These and many others exhibit lively imagination and good taste. The *Thamariani* is a panegyric epic on Queen Tamar, by Tchakhakhadze. In poetry, there are versions of lyrical poems from the Greek, &c., by Georgi Aphoni (11th century); didactics by King Theimuraz; *Tegobil-signaoba* (Treatises by Order), by the above-mentioned catholicos and prince Antoni, a collection of historic odes; there is also a very keen satirical work by Bessarion Gabas Khoili. There are many histories of Georgia, chronicles, biographies, histories of families, monasteries, &c. The princess Makrina, about 1710, wrote a menonasticon (names of months); the last king David wrote on artillery and geography; King Irakli translated J. Sonnenfels's treatise on police, from a Persian version (Tiflis, 1782). Several princes have written accounts of their travels, as Sulkhan-Saba in Europe (1718), Bishop Jonas in Asia Minor, Venice, Austria, &c. (1789-'96), &c. The drama began to be cultivated at a late period, especially by Prince Eristov. Wakhtang VI. established a printing office at Tiflis. There are also there at present a national theatre and opera house. The *Aurora*, a periodical established in 1857, and the *Kavkas*, a Russian newspaper, are published at Tiflis.—On the Georgian language, see Stefano Paolini, *Dizionario Georgiano-Italiano* (Rome, 1629, the first Georgian book printed in Europe); Maggio, *Syntagma Linguarum Orientalium quas in Georgia Regionibus audiuntur* (Rome, 1670); Firloff, *Russo-Georgian dictionary* (St. Petersburg, 1820); J. Klaproth, *Vocabulaire et grammaire de la langue Géorgienne*, incomplete (Paris, 1827); Brosset the younger, *Éléments de la grammaire Géorgienne* (Paris, 1837); Tchubinoff, dictionary in Georgian, Russian, and French (St. Petersburg, 1840), and Russo-Georgian (Tiflis, 1857). On the literature, see J. G. Ch. Adler, *Museum Orycticum* (Rome, 1782); Alter, *Ueber Georgische Literatur* (Vienna, 1798).

GEORGIUM SIDUS, the name given by Herschel to the planet Uranus, in honor of George III., the reigning king of England when he discovered it.

GEPIDÆ, a Germanic people of Gothic origin, who first appear in history in the 8d century A. D. They came from Scandinavia, drove the Burgundians from the plains of the Vistula and Oder, occupied that region, then moved further S. and lived N. of Pannonia, between the Ostrogoths on the E. and the Visigoths on the W. Compelled to follow Attila, they became independent under their king Aderic, after the death of that conqueror, and lived on the lower banks of the Theisa, Danube, Drave, and Save, by turns as friends and enemies of the Byzantine empire. Theodoric, king of the Ostrogoths, defeated them in the battle of Sirmium (now Szerém in Slavonia) in 488. Alboin, king of the Lombards, assisted by the Avari, destroyed their power in 566.

GERA, a town and domain in the German principality of Reuss-Schleig; pop. of the former, 12,500; of the latter, with an area of 72 sq. m., 82,300. The town, situated in a beautiful valley on the right bank of the White Elster, 35 m. S. S. W. from Leipsic, consists of the town proper and two suburbs, and is regularly built, having been restored in modern style after a great conflagration in 1780. It has manufactories of woollens, cotton, linen, camlet, porcelain, stoneware, tobacco, leather, soap, musical instruments, and fire engines. It has large breweries and dyeing establishments, and carries on a considerable trade. A bank was established there in 1856. Its old castle dates from 1086, when the place first became a town, and was first bestowed on the baron of Reuss in the 12th century.

GERANIUM (Gr. *γέρωνος*, a crane), the popular name for a great many species of plants belonging to the natural order *geraniaceæ*, and divided into 4 principal genera, *erodium*, *geranium*, *Monsonia*, and *pelargonium*. The geraniums are either herbaceous or shrubby plants, exogenous, having swollen stems separable at the joints, opposite or alternate leaves, membranous stipules, and commonly symmetrical flowers, varying from those of a small size to those of remarkable proportions, beauty, and even splendor. Some are so insignificant as to be classed with weeds when fortuitously introduced in cultivated ground, while others are eagerly sought after as ornamental and attractive plants. The peculiar form of the capsules containing the seeds, which end in twisted arms resembling the beak or bill of some kinds of birds, gives the trivial name of oransbill to the entire order, and furnishes distinctive divisions to facilitate the study of the numerous species. Thus, *erodium* is derived from *εραδός*, a heron, and comprises numerous species, mostly natives of Europe, some of northern Africa, of Asia, and America. They are either herbs or undershrubs, having variously shaped leaves and many-flowered peduncles. *E. moschatum* (musky heronsbill) is a widely distributed European plant, found at the Cape of Good Hope and in Peru, a small but handsome sort, growing in dry sandy places, and emitting a strong musky

scent. *E. cicutarium* (the hemlock-leaved heronsbill) is found indigenous in the whole of Europe, and even in the north of Africa, and, according to Don, extends to Chili. Nuttall found it common in Oregon and California, and considers it "certainly not introduced" there. It has been seen on the shores of Oneida lake, but is thought to have been adventitiously introduced. Another species, *E. macrophyllum* (Hooker and Arnott), with cordate leaves 2 to 2½ inches long, and with 8 to 5 flowered umbels, occurs in California. The annual kinds, several of which are handsome enough for the flower bed, require only to be sown in the spring in any kind of soil. The perennial species are still more ornamental, but equally ready to thrive under ordinary care. Those raised in greenhouses are most sub-shrubby, and do best in a mixture of sandy loam and leaf mould.—The genus *geranium* contains herbs, rarely sub-shrubs, having palmately lobed leaves, 1 to 2 flowered peduncles, and bearing usually beautiful flowers of various tints and hues. There are both annual and perennial kinds. Some with elegant flowers are to be met with in gardens, being of the perennial species, such as *G. collinum* (a native of Caucasus), in mountain meadows, with finely colored purplish blue petals; *G. phæum*, with dark brown petals, almost black, each having a white spot at its base. This is considered the rarest of British species, and is much admired and cultivated for its singular beauty. *G. sanguineum*, found plentifully in England, has large, beautiful crimson or blood-red flowers, which blossom most of the summer; it grows in rather dry soil. *G. anomifolium*, a species occurring at the Cape of Good Hope, is of rare beauty with its large, fern-like, glossy foliage of the most delicate green, and its rich red blossoms. *G. maculatum*, the cranesbill or crowfoot of the United States, is conspicuous in early summer in every neglected border of the fields and on the edges of the woods of New England, extending however even to South Carolina. Its large rosy-purple flowers, borne upon sub-corymbose peduncles rising above its expanded 8 to 5 parted leaves, attract the attention. As the flowers fade, the lower leaves early assume rich crimson and orange tints. This species is well suited to the garden, growing well and increasing in abundance of blossoms without any extra care. Its roots possess a fine astringency to such a degree as to be called alum root in some sections, while as a popular remedy for dysentery under the name of cranesbill it is equally sought. It is stated that large quantities of tannin and gallic acid exist in it. Two other perennial species, *G. orianthum* of the N. W. coast, and *G. albidiflorum* in the valleys of the Rocky mountains, are allied to it; the latter with white flowers as its name implies, the former with large purple blossoms, the bases of whose petals and stamens are densely villous. Of the annual kinds we have *G. Robertianum*, or herb Robert, a beautiful plant common in our

woods, especially among rocks and in the rich black mould of their crevices, where they are partially shaded. Its flowers, though small, are numerous and prettily striped and rosy, and its foliage so delicately cut and borne upon long slender petioles, that it is well adapted for the garden, especially in the rockwork. A heavy disagreeable odor is however emitted from its leaves, if slightly touched or carelessly handled. Frequently in the autumn the leaves are curiously dotted with minute black specks, the perithecia of a parasitic fungus (*dothidea Robertianum*). *G. Carolinianum*, similar, with paler flowers and scentless foliage, erroneously supposed to be *G. dissectum*, occurs in waste places on barren soils, and is widely diffused. *G. pusillum* (small-flowered cranesbill), with slender stems, rounded, 5-parted, kidney-formed leaves, and small bluish-purple petals, has been found in waste places in New York and Boston, although a European species.—In honor of Lady Ann Monson, who introduced into Great Britain many curious plants from India, and who was distinguished for her botanical acquisitions, we have the genus *Monsonia*, remarkable among the *geraniaceae* for its large, showy, and even splendid flowers, consisting of a calyx of 5 equal sepals, and 5 equal petals twice the size of the calyx; all perennial plants, with toothed, lobed, or decompound leaves. Considerable diversity in the form of foliage, and in the entire or divided edges of the petals, is to be found among the species. They are all natives of the Cape of Good Hope. Mr. Don affirms that the entire genus consists of very showy herbs, deserving to be cultivated in every greenhouse. Their favorite soil, according to Sweet, is a mixture of light turfy loam and decayed leaves. They are easily increased by cuttings or by pieces of the roots, using the hand glass to facilitate the operation. *M. speciosa* is a showy flower, and *M. lobata* has very beautiful unexpanded buds, more showy than the rosy corollas, requiring the bright rays of the sun to bring them to perfection.—The genus *pelargonium* derives its name from Gr. *πελαργος*, a stork, and the storksbill geraniums are those best known in indoor culture. With the exception of a very few, the species, exceedingly numerous, are natives of the Cape of Good Hope. Indeed, so vast in number are the kinds, that artificial distinctions are invented in order to arrange them. Of these, the most curious as well as prominent are of the sections of the stemless and tuberous-rooted, which have all their leaves near the base of the plant or just above the summit of the root. The leaves vary greatly in form, being either oblong and entire, or lobed with the lobes entire, or hardly toothed, or cordate-sagittate with 8 lobes, or pinnate with the leaflets cut and even multifid. The flowers are supported on long peduncles, are of moderate size, but frequently of rarest beauty, and in the hybrid sorts the colors are of the richest tones. There are some whose flowers are dingy or yellowish, but which com-

pensate for want of beauty by emitting a powerful fragrance on the approach of evening. *P. apiifolium* (celery-leaved storkbill) and *P. vespertinum*, a hybrid variety, may be cited as instances. There are also the sad or thistle-flowered, having pale greenish yellow blossoms, but at dusk uniformly very fragrant. A section called *fulgida* exhibits kinds with flowers of the greatest splendor, with intense purple or scarlet colors, such as *P. sanguineum*. From these stemless and herbaceous though perennial species, we can trace gradations in others whose stems are flexible and inclined to climb, with fleshy, peltate, and 5 lobed leaves, few-flowered umbels, and pale purple blossoms; considered desirable on account of their clean, lustrous foliage, emitting on being bruised a pleasant scent, admirably fitted for baskets as hanging plants, or to be trained on small wire trellises in pot culture. Of these the most familiar is *P. peltatum* (peltate storkbill), a universal favorite, blooming very freely when kept rather dry, but producing glossy and large leaves in cool and moist situations. A variety with variegated leaves is known. A beautiful white-blossomed species of similar habits is the *P. scutatum*. Through such half woody-stemmed species we reach the fleshy and shrubby kinds in the group of *ciconia*, embracing those whose stems are tall, the umbels producing a profusion of blossoms of some single color, such as *P. zonale* or horse-shoe geranium, so called from a dark discolored semicircular line on the disk of the rounded, crenate leaf. The flowers of this species are borne in large showy heads, supported on very long peduncles; they are scarlet or red, rose, pale, or white. A distinct variety is *P. martinatum*, where the leaves cease to be zonate, and have instead a white or yellowish margin, and known as the silver-leaved geraniums. Some of the choicest hybrids for ornament are found here, possessing fanciful names to distinguish them from each other, either as dwarf sorts, or kinds of prostrate habit, or for some peculiar color of the petals. Such sorts are bedded out in borders or on lawns, producing a unique or gorgeous effect from the profusion and brilliancy of their bloom. These low and prostrate kinds are extreme aberrations from the usual attitude. Another species, *P. inquinans*, has bright crimson or scarlet flowers, and the foliage on being bruised by the hand leaves behind a stain of a brownish color. The hybrid from it, called *P. Bentinckianum*, is described with flowers of the intensest scarlet. This is a tall-growing sort, attaining a height of 4 feet. A writer in London's "Gardener's Magazine" (vol. vii. p. 677) speaks of a seedling of the variety called Waterloo, which had a stem 5 feet 10 inches high, and measured at 5 feet from the ground 5½ inches in circumference. It is stated on good authority that when trained to stakes or otherwise supported, the species belonging to the *ciconia* will grow 8 or 10 feet high. One which came within our own observation, trained on the back wall of a green-

house, considerably exceeded that height, and the woody stem near the base of the plant furnished a tolerably stout and stiff walking stick. The succulent fleshy habits of these species adapt them to endure long continued droughts without seriously endangering their vitality; and when kept dry in sand and free from frost, they can be easily preserved through the winters and planted out for successive summers. Taking a hint from this fact, Mr. Loudon advises, in his *Arboretum Britannicum*, the trial of some sorts, by planting them at the foot of warm walls, covering the roots on approach of frost with litter so deep as to exclude cold and moisture, and thus acclimating them; an experiment, even in the hardest wooded sorts, better adapted to England than to our climate. With more suffruticose stems, still rising to considerable heights, we find the most magnificent flowers among those series which comprise those with unequal-sized petals, the 2 upper ones being broader and longer, and the 8 lower being narrow. In these, the colors vary from pure white and rosy to purple and the deepest crimsons. In *P. cordatum* (heart-shaped storkbill) the upper petals are very much broader than the lower, which are indeed scarcely more than linear. In *P. betulinum* (birch-leaved storkbill) the upper petals are beautifully pencilled with crimson streaks. Among the purple sorts is *P. cucullatum* (hood-leaved storkbill), in which the upper petals are of a rich purplish red, but marked with darker purplish streaks. In *P. ternatum* the foliage is deeply cut and the lobes sharply serrated, but the markings on the upper petals are reduced to a few shortened and thick lines. From the nearly entire-edged foliage of the first mentioned, we notice by similar gradations those whose leaves are deeply parted into segments and lobes, as *P. quercifolium* (oak-leaved storkbill); and in *P. radula* (rasp-leaved stork's bill) we notice a palmated leaf with narrow and pinnatifid lobes; while others of the hybrid sorts are carried to still minuter divisions. Such a variety of forms in the contour and outline of the foliage would be enough, independent of the richness of the blossoms, to entitle this order to regard. The pelargoniums all mix freely, and hybridization is easily effected. By this process the most bizarre and the most magnificent varieties are produced. To such extent is this carried, that what are called prize flowers seem scarcely related to the original species, so much are the petals increased in size, in depth of color, and in equality of the lower petals with the upper. In some the face of the blossom assumes nearly a circular outline, while in others art has produced irregularity nearly monstrous in the jagged edges, in the strange contrast of tints, and in the tendency to become double; such sorts are pronounced fancy blooms. When hybridization is to be performed, the flowers of the plant to be artificially impregnated are early deprived of their stamens before the anthers burst, care being taken not to injure the stigma. The

farina or pollen is selected from the richest and choicest kinds, it being admitted that the offspring follow more nearly the character of the male parent. The capsule soon swells and ripens, when the seeds are sown, and a few months' patience is rewarded by new and perhaps choicer hybrids. Scarcely any other plants are propagated so easily, and pieces of the young stems, cut across just below the joint and planted in sandy soil, root freely, especially if stimulated by gentle heat. Slips from the roots will send out buds and make new plants by similar treatment. Some of the dwarf woody-stemmed kinds have been grafted; and *P. tricolor*, when worked upon the summit of a taller variety, exhibits a charming effect from its sea-green foliage and brilliant flowers of black, red, and white. Light and plenty of air, with occasional sponging of the leaves to remove dust from their surface, and with moderate heat, are the chief requisites in parlor culture; but on the appearance of the buds an increase of water should be given. In their growing condition slight watering is found best, as too great a quantity causes the plant to grow weak and run to leaves. A splendidly illustrated work on the species and varieties of pelargoniums was published in London between the years 1830 and 1880 by Robert Sweet; but the demand for the newer sorts caused these now almost obsolete kinds to be lost, and the distinct and original species it records furnish the chief value of the book. In London's "Encyclopædia of Gardening" (2d ed., 1834) may be found a list of the finest hybrids extant at that time; while the catalogues of every year enumerate hundreds of the latest, which fashion or fancy has produced at home or abroad. To reduce these to their specific position, and to discover their parentage and ancestry, would prove as difficult a task as the result would be curious and gratifying. Those cited in this article are mostly distinctive species, originally brought from the Cape of Good Hope, and seldom seen now except in the collections of the botanist.—The *geraniaceae* furnish little of utility to man, unless as commercial articles of an ornamental kind in the florists' trade; though *P. antidysentericum* is used among the Namaquas as a remedy for diarrhoea, the roots of *P. triste* are eaten at the Cape, and in Van Diemen's Land the native carrot is the root of *G. parviflorum*, while an astringent principle is characteristic of the order.

GERANDO. I. JOSEPH MARIE DE, baron, a French philosopher and statesman, born in Lyons, Feb. 29, 1772, died in Paris, Nov. 10, 1842. The son of an architect, he was educated in the college of the *oratoire* at Lyons, and was preparing for the priesthood against the wishes of his family when the revolutionary persecutions of ecclesiastics led him to change his purpose. When in 1793 his native town was besieged by the troops of the convention, he took arms for its defence, distinguished himself for bravery, was made prisoner, and narrowly escaped death. Obligated to flee for safety, he

went to Switzerland and thence to Italy, and was employed 2 years in a commercial house in Naples. He returned to France after the proclamation of an amnesty to the Lyonnese emigrants, and in 1797 was persuaded to go to Paris by his relative and former schoolmaster, Camille Jordan, who had been appointed a member of the council of 500. On the 18th Fructidor he succeeded in saving the life of his relative, whom he accompanied in his flight to Germany. He then joined a regiment of cavalry in the French army, and was in garrison at Colmar when the French institute proposed the question: "What is the influence of signs on the formation of ideas?" De Gerando hastily wrote a dissertation on it, and learned that he had received the prize soon after the battle of Zürich, in which he had taken part. Invited to Paris, he entered the ministry of the interior under Lucien Bonaparte in 1799, became secretary-general of that department under Champagny in 1804, accompanied him to Italy in 1805, was appointed master of requests in 1808, was afterward engaged in the organization of Tuscany and of the Papal States when they were united to France, received the title of councillor of state in 1811, and was called to the difficult office of governor of Catalonia in 1812. On the fall of the empire he retained the dignities of councillor of state, baron, and officer of the legion of honor, to which he had been raised by Napoleon; but for having been sent to organize the defence of the Moselle during the Hundred Days he was at first discarded after the second restoration, but soon resumed his place in the council of state, which he held during the rest of his life. In 1819 he began a course of lectures before the faculty of law in Paris on public and administrative law, which were suspended in 1822, and resumed under the Martignac ministry in 1828. In 1837 he was raised to the peerage. Though distinguished for his discretion and ability as an administrative officer, and for his zeal in promoting national industry, useful discoveries, and charitable associations, he is remembered chiefly for his philosophical writings. In the leisure which he enjoyed after his dissertation was crowned by the institute, he enlarged it, and published it under the title *Des signes et de l'art de penser considérés dans leurs rapports mutuels* (4 vols. 8vo., Paris, 1800). His other principal philosophical works, in which he follows with some deviations the school of Condillac, are the treatise *De la génération des connaissances humaines* (Berlin, 1802), and the *Histoire comparée des systèmes de philosophie* (3 vols. 8vo., Paris, 1808), a posthumous addition to which appeared in the 3d edition (1847-'8). The latter is much superior to any French work on the history of philosophy that had preceded it. In 1825 he received the prize of the academy for his treatise *Du perfectionnement moral et de l'éducation de soi-même* (translated into English, Boston, 1880), the fundamental idea of which is that life is a discipline whose object is perfec-

tion. The 5 leading motives which solicit the will are sensations, affections, thought, duty, and religion; and the two conditions of harmonious development are a love of goodness (*l'amour du bien*) and a habit of self-control. His *Voyageur du pauvre* also received the prize of the academy (1821). In 1827 he published a work in 2 vols., entitled *De l'éducation des sourds-muets de naissance*. His *éloge* was pronounced by Beugnot and Bayle-Mouillard.

II. AUGUSTE DE, nephew of the preceding, a French traveller and author, born in Lyons, April 4, 1809, died in Dresden, Dec. 8, 1849. After completing his collegiate course he began to study law in accordance with the advice of his uncle, who was also his guardian. In his 21st year he met the young countess Emma Teleki of Hungary, and, prevailing over the objections both of her friends and his own, was married to her at Paris in 1830. He immediately departed with his wife through Austria and Hungary to Hosszufalva in the northern part of Transylvania, the residence of her father, Count Emeric Teleki. For several years he was occupied in studying the social and political characteristics of Transylvania and Hungary, and early determined to awaken the sympathy of liberal minds in the west of Europe for the men who were seeking the development of the institutions and the extension of the liberties of those countries. He visited France in 1840, but returned to Transylvania in time to witness the assembling of the diet in 1841, and in 1844 published in Paris an "Essay on the Origin of the Hungarians," tracing them in accordance with their own traditions to the Huns. In the following year appeared his "Transylvania and its Inhabitants," which had a wide circulation in Europe, and treats fully of the population, antiquities, and history of the country, and especially of the efforts of the Hungarians for national independence. In 1845 he again left France for Hungary, and resided at Hosszufalva and Pesth till in 1848 he published a work entitled *De l'esprit public en Hongrie depuis la révolution Française*, containing an elaborate sketch of the political history of Hungary from 1790 to the assembling of the diet in Nov. 1847. It appeared in French, German, and Hungarian. He returned to Paris on hearing the news of the French revolution of 1848, and contributed numerous articles to the *National* newspaper, giving exact information on Hungarian and Austrian affairs. His health failing, he retired to Nancy, but returned to Paris in May, 1849, and published in the *National* a series of essays entitled *Les steppes de Hongrie*. He left France in July for Hungary, and was on his way to join Dembinski, intending to write a history of the campaign, when he heard of the surrender of Gorgey, and escaped into northern Germany. He did not recover from the shock occasioned by the fall of Hungary, and, unable to undertake the journey to France, was joined by his wife and other friends at Dresden a few weeks before his death.

Michelet offered a tribute to his memory as "the author of two works, in one of which he unveiled an oriental world before unknown to us, and in the second proved that those distant people were not wholly foreign to us, that in political sympathy they were ourselves;" and as, by his connection with the Parisian press, "disputing the ground, inch by inch, with the falsehoods of absolutist Europe."

GÉRARD, CÉCILE JULES BASILE, a French officer, called the lion-killer, born in Pignans, Var, June 14, 1817. Enlisting in the Spahis, he landed in Africa in 1842, and 2 years later killed his first lion. He took a fancy for the sport, in which he has evinced extraordinary tact and courage, and in 1855 had killed no fewer than 25 lions. He has given the results of his experience in 2 books: *La chasse au lion* (1855, 2d ed. 1856), and *Gérard le tueur de lions*, written under a pseudonyme (3d ed. 1858). The latter has been translated into English (New York, 1857).

GÉRARD, ÉTIENNE MAURICE, count, a marshal of France, born in Damvilliers, Meuse, April 4, 1773, died in Paris, April 17, 1852. The son of a notary, he enlisted in 1791 as a private soldier, served under Dumouriez and Jourdan, distinguished himself in the battles of Fleurus (1794), Kreuznach (1795), and Teining (1796), and as aide-de-camp of Bernadotte at Vienna, and obtained a colonelcy in 1800. He signalized himself at Ansterlitz, Halle, Jena, and Wagram, receiving as reward for his services the rank of general of brigade and a barony. After service in Portugal and Spain, he joined the Russian expedition, gave new proofs of valor and talent, and as general of division evinced unflinching energy during the retreat from Moscow. He was severely wounded in the campaign of 1813, and in 1814 fought successfully against the invading troops at Dienville, Montreuil, and Méry. During the campaign of 1815 he was placed under the command of Marshal Grouchy, who had orders from Napoleon to prevent the Prussians from joining the English army under Wellington. On the morning of June 18, hearing the report of cannon, he strongly urged a march toward Waterloo, but was overruled. Had his advice prevailed, the issue of the battle might have been changed. On the fall of Napoleon, Gérard left France, and did not return till 1817. In 1823 he was elected deputy, and took his seat among the opposition members. He contributed to the success of the revolution of 1830, and after being minister of war for 8 months, reentered the chamber of deputies, was promoted to the rank of marshal, April 17, 1831, and was intrusted with the command of the French army sent to protect Belgium against Holland. He commanded at the celebrated siege of Antwerp, which he forced to capitulate, Dec. 23, 1832. In 1834 he again held for 3 months the office of minister of war. He was made count in 1813, peer in 1832, grand chancellor of the legion of honor in 1835, and senator in 1852.

GERARD, FRANÇOIS PASCAL SIMON, baron, a French painter, born in Rome in 1770, died in Paris, Jan. 11, 1837. He entered the studio of David in 1786; in 1792 he visited Italy, but soon returned, and exhibited in 1795 his first great picture, "Belisarius," which was received with marked favor. "The Three Ages," "Cupid and Psyche," "Ossian," and the "Battle of Austerlitz," which appeared in succession from 1806 to 1810, established his fame. The last was applauded for its accuracy and beauty by the emperor, who, as well as nearly all the members of his family, had their portraits painted by Gérard. The return of the Bourbons did not diminish his success. At the command of Louis XVIII. he executed in 1817 his "Entry of Henry IV. into Paris." In 1819, at the request of Prince Frederic Augustus of Prussia, he painted his "Corinne at Cape Miseno," a beautiful scene from Mme. de Staël's novel. His "Louis XIV. declaring his Grandson Philip of Anjou King of Spain" appeared in the public exhibition of 1828; and his "Coronation of Charles X." in that of 1829. Under Louis Philippe he executed various important works in the halls of the historical museum at Versailles and in the cupola of the Pantheon. The latter, completed in 1836, were the last of his performances. During his career, beside 80 historical pictures, some of which are of very large dimensions, he painted nearly 300 portraits.—His nephew, HENRI GÉRARD, has published a collection of his works, with a notice and explanations (3 vols. folio, Paris, 1852), and is also preparing the correspondence and MSS. of his uncle for publication.

GERARD DE NERVAL (GÉRAUD LAURENCE), a French author, born in Paris, May 21, 1803, died there, Jan. 24, 1855. He published, when 18 years old, a series of poems, entitled *Élégies nationales*, and in 1828 a new translation of *Plautus*, which, according to Goethe himself, was a marvellous piece of ingenuity. He soon became a contributor to periodicals, tried his hand at the drama, and wrote pieces of various kinds, either by himself or in conjunction with Alexandre Dumas. One of the latter, *Leo Burckart*, was published in 1839 with notes. About 1840, on the death of the actress Jenny Colon, whom he devotedly loved, he took to travelling, and published narratives of journeys through Italy, Germany, Belgium, Holland, Greece, and the East. On his return to Paris in 1844, he was for a while the substitute of Théophile Gautier as *feuilletoniste* of the *Presse*. In 1850, in conjunction with Méry, he produced, under the title of *Le chariot d'enfant*, a metrical translation of an Indian drama. He then undertook a series of philosophical and biographical essays upon eccentric characters, which he collected under the title of *Les illuminés, ou les précurseurs du socialisme* (1852). The erratic mode of life, solitary meditations, and sad remembrances of Gérard had caused a mental disease, which, though apparent in most of his actions, did not interfere with his literary productions, and perhaps added a charm to them. On the

morning following the anniversary of the death of Jenny Colon, he was found hanged and dead in one of the foulest streets of Paris.

GERASA, or GALASA (now *Jerash*), a ruined city of Syria, in ancient Decapolis, 80 m. S. S. W. of Damascus, situated on the opposite slopes of 2 hills, between which flows the river Keruan. The most interesting of its magnificent remains extend along the right bank of the stream, and comprise a Corinthian temple and triumphal arch, 5 or 6 other temples, and 2 theatres, all of marble; a naumachia, or artificial basin for the representation of sea-fights, and a small temple, with a semicircular Ionic colonnade from which a street, lined with rows of columns; traverses the city. At right angles with this are 3 other streets, all full of relics of ancient greatness. There are raised walks for foot passengers on either side, while the centre course still shows marks of chariot wheels. The walls, which are pierced by 3 ornamented gateways, and flanked by occasional towers, are in tolerable preservation. Outside is an extensive necropolis; 200 yards N. E. is a large reservoir, and near it can be traced an aqueduct. The river and valley are crossed by 2 bridges. There are 2 grand baths, and inscriptions, chiefly of the time of Antoninus Pius, but in general much defaced, are met with in all directions. The ruins are reported by Irby and Mangles to be much finer than those of Palmyra. The city was built by the Romans after their eastern conquests, was burned by the Jews to avenge the massacre of their Cæsarean brethren by the Syrians, taken and again burned by Annus, one of Vespasian's generals, and in 1122 captured by Baldwin II. of Jerusalem, who destroyed its castle.

GERHARD, EDUARD, a German archæologist, born in Posen, Nov. 29, 1795. He was educated at Breslau and Berlin, studying under Heindorf, Schneider, and Böckh. Resigning a professorship on account of weak eyes, he travelled in Italy, and resided 15 years in Rome. He was engaged on Platner's "Description of Rome," planned by Niebuhr, and then directed by Bunsen, for which he undertook to furnish a complete account of the sources of knowledge concerning ancient Roman topography, under the title of *Scriptores de Regionibus Urbis*. This task, however, was not completed. In order to unite all the departments and details of antiquarian knowledge, he proposed the establishment of archæological societies, and a systematic correspondence between them, and reproduction by engravings and descriptions of all known antiques. When in 1828 the crown prince of Prussia visited Italy, Gerhard accompanied him to Naples, and obtained his protection for an archæological society, the *Instituto di corrispondenza archeologica*, founded at Rome, among the members of which were Bunsen, Panofka, the duke of Luynes, Millingen, and Gerhard, who directed it till his return to Prussia in 1837. He was afterward appointed archæologist of the royal museum at Berlin, professor in

the university of that city, and member of the academy of sciences. Among his numerous writings are *Antike Bildwerke* (Stuttgart, 1827-'44, with 140 copperplate illustrations); *Auserlesene Griechische Vasenbilder* (3 vols., Berlin, 1839-'47, not yet completed, with 240 plates); *Griechische und Etruskische Trinkschalen* (1848); *Etruskische und Campanische Vasenbilder* (1843); *Trinkschalen und Gefäße* (1848-'50); *Ueber die Hermentbilder auf Griechischen Vasen* (1856); and a large number of monographs and contributions to periodicals.

GERHARDT, CHARLES FRÉDÉRIC, a French chemist, born in Strasbourg, Aug. 21, 1816, died there, Aug. 19, 1856. The son of a manufacturer of chemical products, his studies were naturally directed to the science connected with the profession of his father. He was in 1831 and 1832 a member of the polytechnic school at Carlsruhe, and afterward attended Erdmann's course of lectures at Leipsic. In 1835 he pursued his scientific studies in Liebig's laboratory at Giessen, and in 1838 removed to Paris, where he devoted himself to chemical investigations. In 1844 he was appointed professor at Montpellier, where he remained 4 years. His most important publication during this period was one upon the essential oils. From Montpellier he returned to Paris and established a private laboratory, in which he continued his researches till 1855, publishing during this time his original papers upon homologous series, the theory of types, the anhydrous acids, and the starches. In 1855 he accepted the chair of chemistry and pharmacy at Strasbourg, which he lived to occupy only one year. His studies were chiefly in the field of organic chemistry, and were in great part directed to the establishment of a correct system of classification of the numerous compound bodies belonging to this department. He introduced simple methods of grouping results so that they should most readily lead to new discoveries, and present classes of phenomena in a clear connection to the mind, and consequently in a form to be most easily retained. He regarded chemical formulæ not as presenting a fixed absolute value, but rather the equivalent compositions of bodies, an idea first advanced by Chevreul. Among Gerhardt's most important publications is the *Traité de chimie organique* (4 vols. 8vo., 1854-'6), upon which he was occupied a large portion of his life, and in which he presents a complete account of the actual progress of organic chemistry together with his own peculiar views. The work was intended as an appendix to Berzelius's *Chimie minérale*. He also published translations of some of Liebig's works, beside other treatises of his own.

GERHARDT, PAUL, a German poet and theologian, born in Gräfenhainichen, Saxony, March 12, 1807, died in Lübben, June 7, 1876. Little is known of his life till in 1851 he became pastor at Mittenwalde, a position which he exchanged in 1857 for that of deacon in the church of St. Nicholas, in Berlin. He was there a partisan of the strict Lutherans against

the syncretism of Calixtus and his followers, and was deprived of his diaconate because he refused to obey the edict of 1664 forbidding either party to defame the other in the pulpit or tax it with heresy. In 1668 he became archdeacon in Lübben. He is esteemed the author of the best German hymns after those of Luther; several of them were translated by John Wesley, and are found, in part at least, in the Methodist hymn book. In Germany they were first collected under the title of *Geistliche Andachten in 120 Liedern* (Berlin, 1666; 4th ed. 1688), and many of them are contained in most of the Protestant hymn books in Germany. Of their numerous editions, the last is that of Wackernagel (Stuttgart, 1849).—See C. A. Wildenhahn, *Paul Gerhardt, ein kirchengeschichtliches Lebensbild* (Leipsic, 1845; 2d ed. 1850).

GERIOULT, JEAN LOUIS THÉODORE ANDET, a French painter, born in Rouen in 1790, died in Paris, Jan. 18, 1824. He was a pupil of Carle Vernet, and of Guérin, and his first pictures attracted little attention. In 1816 he went to Italy, and in 1819, on his return to France, he exhibited the "Raft of the Medusa," a most dramatic scene, executed in the most powerful style, which was enthusiastically received, and is still considered one of the masterpieces of the French school.

GERLACH, ERNST LUDWIG VON, a Prussian statesman, born in Berlin, March 7, 1795. After the war of liberation (from 1813 to 1815), in which he had taken part with his brothers Leopold and Wilhelm, he joined in Berlin a celebrated club, where a circle of highly gifted men discussed the political and ecclesiastical regeneration of Prussia, thus forming a nucleus for the high church aristocratic party, of which Gerlach has been for many years the leader. After having been in succession councillor, director, and president of divers Prussian courts, he was employed from 1842 to 1844 in the ministry of justice in preparing new propositions for the legislation on marriage, and became in 1844 a member of the state council. From 1849 to 1858 he was a member of the Prussian upper chamber and a leader of the extreme conservative party. At the new elections in 1858 he was defeated, in a district which was considered one of the strongholds of the party. From 1831 to 1837 he was a contributor to the *Politisches Wochenblatt*, and afterward one of the founders of the "New Prussian Gazette," for which he wrote monthly articles called *Rundschau*, many of which were also published separately.

GERLAOHE, ÉTIENNE CONSTANTIN DE, baron, a Belgian statesman, born in Biourge, in Luxembourg, in 1785. He began to practise law at Liège in 1815, was appointed a councillor in the court of appeals, and from 1824 to 1830 was a prominent member of the second chamber of the states-general, where he especially endeavored to keep the union of the Catholic and liberal opposition within the limits of law. After the outbreak of the Belgian revolution in 1830,

he induced the Belgian deputies to attend the extraordinary session of the states-general which had been convoked at the Hague. Having returned to Belgium in consequence of the events in Brussels, he became a member of the committee charged with drafting a new constitution, and was elected a member, and, a little later, president of the congress. In this capacity he headed the deputation which offered the crown to Prince Leopold of Saxe-Coburg, to whom he afterward, as president of the chamber of representatives, administered the oath on the constitution. In 1832, at the reorganization of the courts of justice, he was made president of the court of cassation. In 1839 he accepted a mission to the conference of London to make proposals for the settlement of the territorial differences with Holland. He is a prominent leader of the Catholic party in Belgium. His principal work is *Histoire du royaume des Pays-Bas depuis 1814 jusqu'en 1830* (2d and enlarged edition, Brussels, 1842).

**GERMAN CATHOLICS** (*Deutschkatholiken*), the name of a religious denomination, formed in 1844 by secession from the Roman Catholic church of Germany. It owed its origin mainly to a letter, written Oct. 1, 1844, by Johannes Ronge, an excommunicated priest of Silesia, to Bishop Arnoldi of Treves, in which the exhibition of the holy coat of Treves was called an idolatrous festival, and the bishop was called upon to suppress it. In the Prussian province of Posen another Catholic priest, Johann Czerski, had already declared on Aug. 22 his secession from the Roman Catholic church, and had attempted the foundation of a Christian apostolic Catholic congregation. After the publication of the letter of Ronge these two united, and a number of congregations, who called themselves German Catholics, sprang up within a short time. The "Confession of Schneidemühl," drawn up by Czerski Oct. 19, and presented to the government Oct. 27, rejected as unscriptural, and as merely human ordinances, the reception by the priests alone of the Lord's supper in both kinds, the canonization and invocation of the saints, indulgences and purgatory, fasting, the use of the Latin language in divine service, mass, and vespers; the celibacy of priests, the prohibition of mixed marriages, the supremacy of the pope, and other points. They declared themselves determined to sever their connection with the pope, to receive the Lord's supper in both kinds, and to recognize the Bible as the only rule of faith. They retained the 7 sacraments and the mass, which they celebrated in the vernacular language. The "Confession of Breslau," which set forth the views of Ronge, not only rejected the same ordinances as that of Schneidemühl, but claimed free investigation of the Bible and freedom of belief for every individual member. It admitted as essential doctrines only the belief in God, the creator and ruler of the world; in Jesus Christ, who, by his doctrine, his life, and his death, redeemed men from servitude and

sin; and in the influence of a Holy Spirit upon earth. Of the sacraments of the Catholic church it retained only baptism and the Lord's supper. A council which met at Leipsic, March 22, 1845, and in which Ronge, Czerski, and the delegates of 20 congregations took part, adopted (March 26) a new creed, mostly based on the "Confession of Breslau." From this time the principles of German Catholicism spread very rapidly. In Silesia alone the number of German Catholics was estimated in June, 1845, at nearly 50,000; and toward the end of that year the number of congregations in Germany rose to 298. Not only many Catholic priests and professors, as Dr. Theiner and Dr. Regenbrecht of Breslau, and Dr. Schreiber of Freiburg, joined the movement, but also many Protestant clergymen. The attitude of the governments with regard to German Catholicism was very diverse. In Austria and Bavaria it was even forbidden to use the name; in Prussia the question whether they ought to be counted among the tolerated denominations was not definitely decided, but provisional decrees were published concerning their baptisms, burials, and marriages. Great rigor was employed against them by the governments of Baden and the electorate of Hesse, while majorities of nearly all the legislative assemblies declared their sympathy with them. A more serious obstacle to the growth of the new religious denomination than the disfavor of the governments was found in their internal dissensions. There had been from the beginning a radical disagreement between Ronge and Czerski. The latter agreed in general with the doctrines of orthodox Protestantism, while the former adopted almost all the views of the Protestant rationalists. Czerski issued a circular ("New Confession of Schneidemühl") against those who denied the divinity of Jesus Christ. An attempt to unite both parties on a common platform was made in an assembly at Rawicz, Feb. 8, 1846, in which Ronge, Czerski, and Theiner took part; but it had not the desired effect. The congregations sympathizing with Czerski held a meeting at Schneidemühl, July 22-24, 1846, but were not able to effect a closer organization, as they themselves differed among themselves on many points. Among the congregations which followed Ronge there was also a great deal of dissension, so that the interest in German Catholicism began to decrease in 1847. The council of Berlin, held in May, 1847, was attended by deputies of only 151 congregations, and made new efforts to secure a permanent union of the two parties in the church. The revolutions of 1848 seemed to be very favorable. Austria and Bavaria opened their doors to German Catholicism, and congregations were at once formed in Vienna, Munich, and many of the important towns of both countries. Many of the congregations, however, declared themselves dissatisfied with the part which Ronge took in the politics of Germany. After the defeat of the revolution, German Catholicism was again forbidden in Austria



and Bavaria. The second council of Leipsic, which met May 22, 1850, had soon, on account of the interference of the police, to be transferred to Köthen; it proposed an alliance with the Free congregations, which had formed themselves by secession from the Protestant churches, and the election of a joint executive committee from both denominations, which was to act as a presiding board until the meeting of a triennial diet (*Tagsatzung*). These propositions were adopted by nearly all German Catholic congregations, and the first diet was fixed for 1852; but it did not meet. Since that time German Catholicism has been on the decline in nearly all parts of Germany, partly in consequence of the measures adopted against it by the governments, partly in consequence of the continual disagreement among its members. Many congregations disbanded; many others joined the Protestant church in a body. At a conference held at Gotha, Sept. 10, 1858, 42 representatives of the Free congregations and German Catholic congregations appeared, among them Czerski, Uhlich, Rupp, Wislicenus, Baltzer, and nearly all the other prominent leaders. New hopes were raised by the change of government in Prussia in Nov. 1858, which enabled them to reorganize their congregations in several Prussian towns.—The fullest history of German Catholicism is given by Kampe, *Geschichte der religiösen Bewegungen der neueren Zeit* (vol. iii., Leipsic, 1856). The current history of the denomination is given in various weekly journals: *Der Dissident* (Berlin), *Die Kirchenfackel* (Ulm), *Sonntagsblatt* (Gotha), *Deutschkatholisches Sonntagsblatt* (Wiesbaden), and *Königsberger Sonntagspost* (Königsberg).

GERMAN OCEAN. See NORTH SEA.

GERMAN SILVER, or ARGENTANE, an alloy resembling silver, made of variable proportions of its ingredients according to the uses for which it is designed. A composition of 8 parts of copper to 3 each of nickel and zinc is recommended as making a close imitation of silver of  $\frac{750}{1000}$ . The two latter metals are also used in the proportions of 4 each to 8 of copper. By using a larger proportion of copper the alloy is more easily rolled into plates, but the copper sooner becomes apparent in use. Iron used in the proportion of 2 to 2½ per cent. renders the composition whiter but more brittle. The genuine German silver, made from the original ore of Hildburghausen in Henneberg, analyzed by Keferstein, was found to consist of copper 40.4 per cent., nickel 31.6, zinc 25.4, iron 2.6.

GERMAN THEOLOGY. As the theology of the Catholic church of Germany, before as well as after the reformation, forms an inseparable part of the Roman Catholic system, the phrase German theology is commonly restricted to the doctrines of Protestant Germany. The theology of the Roman Catholic church during the middle ages, in the controversies with dissenting systems, both of those seceding from and of those remaining within the church, had more and more recognized the doctrine of the infallibility

of the church as its central dogma. As the Catholic theology knew of no regular way to secure salvation except through the one visible church, so there was no assurance of divine truth to be obtained except through the infallible decisions of the same body. Every apologist of that church had to fall back on this doctrine as his strongest and last fortress; every conviction that any doctrine of the Catholic church was unchristian had first of all to destroy this bulwark. Every attempt to establish a new theology had therefore to be preceded by the rejection of the formal principle of the Catholic theology, the infallibility of the church. The belief in this doctrine must have been shaken in many minds at the beginning of the 16th century, as we meet with so many attempts independent of each other to establish new systems of Christian theology on the ruins of the Catholic church. Foremost among the German reformers stands Martin Luther. He had early arrived at a theory of justification which contained the germ of dissent from the Catholic theology. The celebrated 95 theses, which on Oct. 31, 1517, he affixed to the gate of the Castle church of Wittenberg, were a challenge to the church authorities, but contain no evidence that their author was conscious of the necessity of an entirely new theology. But when, at the diet of Worms (April 17, 1521), he declared: "Unless I am refuted and convinced by proofs from the Holy Scriptures, . . . I yield my faith neither to the pope nor to the councils alone," the necessity of founding a new basis for theology was proclaimed. Next in prominence was Ulrich Zwingli of Zürich, who, even before Luther (in 1516), had begun to preach against what he considered unevangelical in the doctrines and practices of the church. The reformation of Calvin does not properly belong to Germany, though it was not without great influence on the Protestant theology of Germany and of German Switzerland. In 1529 Luther published in his two catechisms an outline of his new doctrinal system. In the following year, the "Confession of Augsburg" was drawn up at the request of the emperor Charles V., as a full exposition of the views of the Protestants, and presented at the diet of Augsburg. In 1531 Melancthon composed the "Apology of the Confession of Augsburg." These 3 works soon became for the Lutheran states an established basis of unity, and received an authoritative character as symbolical books. To them were added in 1537 the "Articles of Smalkald," which drew more distinctly the line of demarcation between the Catholic and the Protestant theologies; and later, in 1577, the "Form of Concord," which was directed against dissensions within the Lutheran church, and against the doctrines of Calvin. All these symbolical books were united in the "Book of Concord," which has ever since constituted the great charter of German Lutheranism. The Reformed (Calvinist) churches issued a large number of confessions of faith, of which, however, very few received more than a local

and temporary recognition as symbolical books. Three of them, the *Confessio Tetrapolitana*, the *Confessio Basiliensis*, and the first "Helvetic Confession," originated before the reformatory labors of Calvin; all those that followed show traces of his influence, though the German churches and their confessions of faith generally softened down the Calvinistic doctrine of predestination. The symbolical books of both the Lutherans and the Reformed, and of all the other reformers who independent of them attacked the Catholic theology during the 16th century, agree in recognizing the Bible as the only rule of faith. This implied the rejection of tradition as a second rule of faith, the rejection of the necessity of an infallible interpreter of the Bible, and the rejection of an authoritative translation (the Vulgate) sharing the inspired character of the original, and to be received as an ultimate appeal in theological controversies. So also in regard to the number of books constituting the Bible, the new theology differed from the Catholic, rejecting from the canon the apocryphal books, though Luther and with him the Lutheran churches considered them as books so "useful and good to read," that they kept them in their editions of the Bible as an appendix. As soon as the Scriptures were recognized as the only rule of faith, and the visible church was divested of its claim of infallibility, the question came up for decision, What is the Christian church? The whole theology of the reformation agreed in defining the church, so far as it is an object of faith, as the invisible communion of real Christians with Christ as the only head of the church. The Lutheran theology, however, introduced another element by defining it as the invisible communion of those to whom the gospel is rightly taught and the sacraments rightly administered. Zwingli viewed the church as the society of the elect. The most difficult question for the reformers to solve was, by what marks the true church could be recognized. Their true meaning became a subject of controversy, and has remained so to the present day. (Ritschle "On the Visible and the Invisible Church," in *Studien und Kritiken*, April, 1859.) The new theology having thus answered the inquiry, How to arrive at a knowledge of the Christian revelation, the second great question was, How is the salvation of man brought about? Here also the immediate relation of God to man and of man to God was substituted for the mediation of the church, and the leading principle of the biblical theology was found in the justification of man by faith alone. Closely connected with the doctrine of justification are the doctrines of original sin, grace, and predestination. The new theology taught that the state of perfect righteousness, holiness, and immortality, in which man was created after the image of God, was originally his true nature, and not an unessential gift added by God to his natural endowments (*donum superadditum*); that by the fall human nature became entirely corrupt, and lost all freedom of the will and all ability to do

good (on this point, however, Zwingli maintained a different opinion); that the sinner is justified by faith alone; that this faith is not merely a belief in historic facts and in promises, but one which embraces, recognizes, and appropriates to itself the merits of Christ. The sacraments were not alone recognized as the means of grace, but these combined with the word of God, and their number was reduced from seven to two. The means of grace were regarded not as *causa efficientes*, but as *causa instrumentales*; not as containing grace within themselves, but merely as conveying it, since the effect was made dependent on the faith of the receiver. They were, however, considered as essential. In opposition to the Anabaptists, both the Lutherans and Reformed denied that the Holy Spirit could be given without the external word. The difference between the Protestant and Catholic theologies in the doctrine of the sacraments showed itself especially in the sacrament of the Lord's supper, all the schools of Protestant theology unanimously rejecting transubstantiation and the sacrifice of the mass. The Catholic doctrines on the veneration of the saints and images, on purgatory and indulgences, so closely connected with the Catholic view of the church, were rejected with equal unanimity. While the two great reformatory schools of Germany agreed in recognizing the Bible as the only rule of faith, and while they further agreed in designating among the doctrines of the Catholic theology those which were to be regarded as unscriptural, they from the beginning disagreed as to a few particular points of scriptural doctrine. These points were especially the Lord's supper, the person of Christ, and predestination. Luther defined the Lord's supper as "the true body and blood of our Lord Jesus Christ, in and under bread and wine." He insisted on the real and actual presence of Christ in the eucharist. Some theologians of the Reformed church, with Zwingli and Ecolampadius, understood the words, "This is my body," as meaning "This signifies my body," regarding the celebration of the Lord's supper merely as a commemorative service; others, with Calvin, regarded it as a partaking of the spiritual body of Christ. With regard to the person of Christ, the Reformed strictly retained the doctrine of the two natures in one person, and confined the presence of the humanity of Christ to heaven. The Lutherans, on the other hand, assumed a real transition of the one nature into the other, a true and real though supernatural and undefinable union of the two natures, in consequence of which each, without losing its peculiarity, shares in the properties of the other (*communicatio idiomatum*); and from this they inferred the ubiquity of the body of Christ. The doctrine of predestination remained subject to many variations. Both Luther and Zwingli rejected the freedom of the will; but the absolute predestination of some to salvation and of others to eternal damnation received its consistent development only in the

system of Calvin. Melancthon taught (after 1535) that election or damnation was dependent only upon the different relation of the will to divine grace operating upon it; but in opposition to this, many Lutheran divines revived the opinion that predestination was independent of the doings of men. The differences of belief thus manifesting themselves between the leading theologians of Germany were at first not considered on any side as an insurmountable obstacle to a union. Several attempts to harmonize them were made, but failed. The symbolic determination of the Lutheran doctrine, and the doctrinal line of demarcation separating the Lutheran creed from the Reformed, gave rise to many controversies within the Lutheran churches. The Antinomian controversy, commenced during the lifetime of Luther and renewed in 1556, related to the obligatory character of the Mosaic law. The Osiandrian controversy, on justification and its relation to sanctification, originated with Andrew Osiander in 1550. The synergistic controversy, on the relation of human freedom to grace, was caused in 1555 by a work of Pfeffinger, renewing an opinion of Melancthon. The controversy on good works, commenced in 1559, was carried on between George Major and Nicolas von Amsdorf, the former maintaining that with a justifying faith good works must necessarily be connected. The so called Crypto-Calvinistic controversy was carried on after 1559 with the orthodox Lutherans concerning the Lord's supper. The Flacian controversy, between Strigel and Flacius, dating from 1560, related to the essence of original sin. It was generally considered as right that the highest authorities in the church should put an end to these and all other controversies, by declaring which was the true doctrine of the Bible. This was attempted by the "Form of Concord," in 1577, but with only partial success, as many of the state churches refused to accept it. Yet it became, in union with the other books, now clothed with symbolic authority, the basis of a Lutheran orthodoxy, which reigned in the larger portion of Protestant Germany with undisputed sway until the middle of the 17th century. The only interruption in the consolidation of the Lutheran theology toward the close of this period was caused by George Calixtus of Helmstädt, who in the spirit of Melancthon sought for a more unfettered form of theology, and even thought that Catholic and Protestant theologies might once more be united by returning to the oecumenical synods of the first 5 centuries, which plan was called by his Lutheran opponents syncretism. The further development of the Reformed church took place mostly in other countries, and affected German theology but little, the most important event in which was the adoption of the catechism of Heidelberg, which gave prominence to the doctrine of divine predestination only so far as it seemed needful to console the Christian with the certainty of redemption, and to that of the eucharist only to impart an assurance of

communion with Christ. One of the doctrines of both the two great reformatory schools, paedobaptism, was rejected as unscriptural by Thomas Münzer (died 1525) and the Anabaptists; and after their views had been suppressed by force, the peaceful community of Mennonites perpetuated the opposition to paedobaptism, though not to the formal principle of the German reformation, which they fully adopted. The Socinian theology belongs only in part to Germany. Its advocates generally recognized the Scriptures as the rule of faith, but demanded at the same time that every opinion contrary to reason should be rejected, thus at least virtually making the Bible interpreted by reason the rule of faith.—A theological principle differing from the Lutheran and Reformed systems, as well as from Socinianism, was developed by Protestant mysticism, which placed by the side of the Bible (in which it emphatically distinguished between the spirit and the letter, frequently identifying the former with Christ) a continuous direct revelation of God in the human soul, as a source of knowledge, and which made the living union with God by means of contemplation and asceticism its most important and central doctrine. It showed itself mostly within the Lutheran church, with which many of its chief representatives strove to remain in external connection, though they never escaped the charge of heterodoxy, and often expressly rejected some of the Lutheran doctrines, and especially justification by faith. The chief representatives of Protestant mysticism, among the contemporaries of Luther, were Münzer, Carlstadt, Schwenkfeld, and Sebastian Frank; later appeared Valentin Weigel, and the greatest of Protestant mystics, Jacob Boehm, whose theosophic system has exercised a marked influence on both the theological and philosophical literature of Germany, even to the present day.—A new movement in German theology arose in the second half of the 17th century through Philipp Jacob Spener, the founder of pietism. Though not openly attacking the dogma in the symbolical form which it had obtained in the prevailing Lutheran theology, pietism considered the stress which had been laid on the theological definition and symbolical determination of the Christian doctrines as ill agreeing with the simplicity of the gospel, and as estranging Christianity from life; and it strove to free it from this estrangement by a return to a practical, biblical, and more inward piety. The central principle of pietism was that Christianity was first of all life, and that the strongest proof of the truth of its doctrines was to be found in the religious experience of the believing subject. As Lutheran orthodoxy grounded Christian theology on the Bible as explained by the symbolical books, so Spener based it on the Bible confirmed and explained by individual religious experience. The theology of the Lutheran schools with almost one voice exclaimed against pietism as a new sect, and the theological faculty of Wittenberg designated in the writings of Spener about 800

false doctrines, yet Spener protested that he accepted the whole "Confession of Augsburg." On scientific theology and its development the influence of Spener was not great, and showed itself mostly by shaking the authority of the Lutheran symbols; but the prayer meetings (*collegia pietatis*) and conventicles (*ecclesiola in ecclesia*) in which he gathered the awakened, created a popular and strictly biblical theology, which perpetuated itself, especially in Württemberg, in several sects, and never ceased to have some representatives in the theological literature and in the chairs of theology. The principles of the pietists were in the main also shared by the Moravians, reorganized in 1724 by Count Zinzendorf. They declared their agreement with the "Confession of Augsburg," but expressly rejected all other symbolical books. The centre of their theology was the cleansing power of the blood of Christ; they regarded themselves as a society for awakening piety, and as such were of marked influence in the history of the religious life of Germany, but of little in the history of German theology.—Almost simultaneously with the rise of pietism begins the influence of philosophy on theology, which more than any other agency drew theology into that direction in which it subsequently developed itself. Both influences had this in common, that they were a transition to a standpoint on which the subject, in opposition to the objectivity of the dogma, strove to constitute itself the determining, absolute principle. But pietism sought in the religious feelings only a confirmation of the revealed theology of the Bible; while philosophy, to which Descartes had assigned the task of finding something absolutely true and certain, had gradually the effect of making the belief in the doctrine of the church, in the Scriptures, and in religion itself, dependent upon the judgment of man's reason. The first step toward this transformation of the formal principle of Protestantism was made when Wolf (1679–1754) introduced into theology his distinction between natural and revealed theology, and a number of "rational thoughts," by which he became the father of German rationalism, though he and his adherents defended most emphatically the harmony of their philosophic system with the revealed word. The system of Wolf was adopted by numerous theologians of both the Lutheran and Reformed churches, and thus at once deeply penetrated into theological literature and theological schools. A contemporary of Wolf, J. A. Ernesti, established the historico-critical school of Protestant exegesis by applying the rules of classic philology to the interpretation of the Bible. Though remaining on the whole faithful to the doctrinal system of his church, he made an attempt to define some of its tenets more accurately according to the results of his critical investigations. Semler (1725–91) distinguished theology from religion (i. e. morality); claimed the right to subject the whole canon to the freest investigation; distinguished between a local,

temporal, and therefore transitory part of the Bible, and the imperishable word of God; and laid down as a supreme principle that the Scriptures are to be regarded as canonical and of divine origin only so far as their contents are of an ethical nature. W. A. Teller (1784–1804) published, on the basis of the biblical studies of Ernesti, Semler, and their followers Michaelis and Eichhorn, a new and purely biblical system of Christian doctrine, and proclaimed a practical religion of reason as the essence of Christianity. A new theory of far-reaching influence was set forth by Töllner (died 1774), who distinguished between Holy Writ and the word of God, the latter of which he found also in all other religions and in reason. He distinguished different degrees in inspiration, and maintained that neither the highest degree belonged to the Scriptures, nor the same degree to all its parts. Against the invasion of this new school the orthodox theology was principally defended by the pietistico-mystic works of Bengel and Crusius, by the theosophic prelate Oettinger, by Zollikofer and Spalding.—English deism was transplanted to German soil by Reimarus (1694–1768) in the celebrated "Wolfenbüttel Fragments," first published by Lessing. He denied the possibility of a revelation, ascribed to Jesus the design of making himself, under the pretext of introducing a new religion, the king of a new Jewish empire, and declared as the principal doctrines of natural religion, which alone he admitted, the doctrines of God, of divine providence, and of the immortality of the soul. The same views as to the truth of natural religion alone we find in the writings of Moses Mendelssohn, a Jew (1729–86), who declared the happiness of man to be the principal aim of religion. Other writers of the same school, as Steinbart (1738–1809), Basedow (1738–90), and Bahrdt (1741–92), endeavored to show that these principal doctrines of natural religion constituted also the essence of Christianity, and frequently made not so much reason as happiness the measure by which the truth of every opinion was to be tested. An important organ of the new theology of "enlightenment" (*Aufklärung*) was the *Allgemeine deutsche Bibliothek*, published (1765–92) by Nicolai. Lessing (1729–81) also partly belonged to this school, though he directed his attacks against the shallowness of the theologians of enlightenment no less than against Lutheran orthodoxy. He maintained that a revelation, to which all men can yield a rational faith, is impossible; that reason alone can determine whether there can and must be a revelation, and which among the many systems that claim to have been revealed is probably a revelation; that revelation gives to man nothing more than reason alone would have sufficiently developed in time; that it is essentially a system of education for mankind, in which the Scriptures are text-books, which may perhaps be superseded when humanity is educated for the reception of the new everlasting gospel.

The path marked out by Lessing was further pursued by Kant (1724-1804), who went into a careful investigation of the faculty of understanding, and arrived at the conclusion that we cannot know things in themselves, and things above the reach of the senses, but that the only thing certain in itself is the moral law, which conducts us to a practical faith in God and immortality. Through him the terms rationalist (one who declares natural religion alone to be morally necessary, though he may admit revelation), naturalist (one who denies the reality of a supernatural divine revelation), and supranaturalist (one who considers the belief in revelation a necessary element in religion) came into use, and rationalism and supranaturalism became the principal division of theological schools. The principles of the Kantian philosophy were introduced into theology especially by Stäudlin and Ammon. The first rationalistic system of dogmatic theology was published by Henke, and the most complete and most celebrated (*Institutiones Theologiae Dogmaticae*, 1813) by Wegscheider (1771-1849); beside whom Paulus of Heidelberg (died 1851), the author of a "Commentary on the New Testament" and of a "Life of Jesus," and Röhr of Weimar (died 1848), author of "Letters on Rationalism," were considered the ablest rationalistic theologians. The foremost representatives of the supranaturalist theology were Storr (died 1805), Knapp, Hahn ("Manual of the Christian Doctrine"), and Steudel. A medium between rationalism and supranaturalism was first attempted by Reinhard, the great German pulpit orator (died 1812), from which time rationalism made decided advances toward the Christian revelation, and supranaturalism acknowledged the possibility and necessity of a reconciliation with science. The most prominent representatives of this mediating theology are Schott (died 1835) and Bretschneider (died 1846). An academic disputation at Leipsic in 1827, and the "Evangelical Church Gazette" of Hengstenberg in 1830, demanded the expulsion of rationalism from the church; against which, however, even men like Neander, Ullmann, and others, protested as an encroachment on the liberty of scientific investigation. As Kant had declared the ideas of God, liberty, and immortality indemonstrable by pure reason, but admitted them as postulates of practical reason, another philosophy, the philosophy of faith (*Glaubensphilosophie*), sought to prove the Kantian postulates theoretically, by attributing to man an immediate consciousness of God, or an innate faith. This idea was the basis of the theological views of Hamann, the "Magus of the North" (died 1788), and of Herder (died 1803), who, as has been said, mixed it with the foam of Spinozism; and it was developed as a philosophical system by Jacobi (died 1819). The influence of the latter on theology was small, for he limited himself to a philosophical proof of the idea of a living God, did not explain his views of the Christian revelation, and

rejected a part of the positive doctrines of Christianity as superstition. J. F. Fries (died 1843) attempted a mediation between Kant and Jacobi by a philosophy of faith and presentiment. He found among the theologians an adherent of influence in De Wette (died 1849), who explained religion as an immediate inner revelation of God in sentiment and faith, and dogma as its symbolic form of expression and development.—Not a mere approximation or partial mediation between rationalism and supranaturalism, but a merging of the two into an entirely new system which was to acknowledge the claims of both, was the task which Schleiermacher (died 1834) proposed to himself. Like the pietists, he started from the principle that a right knowledge of Christianity necessarily presupposes on the part of the subject a personal religious experience. He found the proper source of all Christian life and knowledge in the pious sentiment or Christian consciousness, in which the subject comprehends itself both in the totality of its being, as also in its necessary connection with the human race, and in its being determined by the Christian principle reigning in the race. In this consciousness it becomes assured of the reality of a new, divine, world-redeeming principle of life, which reveals itself in Christianity, and without which the restoration of the right relation of individuals as well as the human race to God is not possible. Revelation is according to him not an external law, claiming submission from the subjective reason; but nothing more is demanded from the latter than to recognize itself as being determined by the Christian principle, and more and more to penetrate itself with it. The external opposition of revelation and reason is supplanted by the closest interpenetration of the two, allowing the greatest freedom with regard to such questions as do not affect the proper sphere of revelation. The movement in the theological world called forth by this system was extraordinary, and can be compared in intensity only with the reformation of the 16th century. Not only did several different theological schools spring from it, but even the schools opposed to it felt its influence. Most of the adherents of Schleiermacher defended from his standpoint all the essential doctrines of biblical orthodoxy; thus Neander ("Church History"), Ullmann ("Sinlessness of Jesus," and "Essence of Christianity"), Lacke, Umbreit, and Olshausen (commentaries), Hundeshagen, &c. Others attempted a middle course between the system of Schleiermacher and those of the German Protestant churches, as Twisten ("Dogmatics") Nitzsch ("System of the Christian Doctrine"), and J. Müller ("Christian Doctrine of Sin"). A third school, however, rejected these two as deviations from the true spirit of Schleiermacher, and claimed the fullest independence of theological investigation with regard to the doctrines both of the biblical and the church theologies. To this school belong A. Schweizer ("Dogmatics of the

Evangelical Reformed Church") and Baumgarten-Crusius ("Dogmatics").—The most recent influence of lasting importance in the development of German theology came from the philosophy of the absolute, which was first introduced by Schelling (1775–1854), but completed as a system by Hegel (1770–1831). In the view of this philosophy, the popular religions which have existed in the world have been the several points by which the divine self-consciousness has developed itself. The essence of religion consists in the relation of man to God. Christianity is called the absolute religion, the realization of the idea of religion, because it presents the unity of the divine and the human, God becoming man, and man becoming conscious of his divine origin and his reconciliation with God. The idea of revelation ceases to be something external, particular, miraculous, and once occurring, and becomes something internal, universal, necessary, and eternal. After the death of Hegel his school became divided into those who used an orthodox and those who used a heterodox mode of expression, or into the right and left wings. The former, full of enthusiasm, proclaimed the identity between the new speculative philosophy and the orthodox dogma, the reconciliation between faith and knowledge. Among its numerous representatives, Daub ("Dogmatics"), Marheineke ("Outlines of Christian Dogmatics"), Rosenkranz ("Cyclopædia of Theological Sciences"), Göschel, Erdmann, and Conradi, were prominent. The last named contended that it was consistently developing the fundamental idea of the master when it proclaimed that religion, carried to its perfection by reason, is only a god worshipping himself, and that a god-man is one who never had an existence as an individual upon earth. From the latter school (the young Hegelians) proceeded D. F. Strauss, who in his "Life of Jesus" (1835) declared the biblical account of the life of Jesus a myth, and in his "Christian Doctrine in its Historic Development" (1840) attacked even the belief in the personality of God and the immortality of the human soul. L. Feuerbach ("Essence of Christianity," 1841) went even beyond Strauss, to the extreme limit of nihilism; he rejected religion itself as a dream and illusion, from which when man awakes he finds only himself. Under the influence of both Schleiermacher and Hegel, F. Ch. Baur of Tübingen introduced the philosophy of religion as a Christian science into the history of Christian doctrines, and in monographs on the history of the doctrine of the Trinity and of reconciliation he sought to comprehend the historic development of the dogma as the dialectic process of the idea itself, and as the development of the undeveloped doctrine of the Bible into a more adequate unity of contents and form. Rejecting the authenticity of most of the books of the New Testament, and ascribing to them a later origin, he endeavored by numerous writings to fill up the vacuum thus left in the history of Christ

and earlier Christianity; in which endeavors he was seconded by a considerable number of young scholars (the Tübingen school), among whom Schwegler ("History of Montanism" and "Post-apostolic Age") and Zeller ("Investigations on the Acts") were the most prominent. The critical works of the Tübingen school called forth an immense number of opponents, who partly modified the new assertions, partly vindicated the old-established views of the churches, but all of whom agreed that by the numerous works thus called forth on both sides a flood of light had been shed on many important events of primitive Christianity. The most important controversial essays against the Tübingen school were those of Thiersch ("Church in the Apostolic Age"), Dörner ("Doctrine of the Person of Christ"), Schaff, ("Apostolic Age"), Bleek, ("Contributions to the Criticism on the Gospels"), Hase ("On the Tübingen School"), Ewald ("Annals of Biblical Science," "The First Three Gospels," and "History of Christ and his Times").—The impulse given to German theology by the various systems of speculative philosophy was a general one, and not confined to the schools that revered Schleiermacher and Hegel as their masters. Many supranaturalists as well as rationalists were greatly influenced by it, though with regard to the systems of Schleiermacher and Hegel they sustained either an eclectic or an independent relation. Thus especially Liebnert, Lange, and Martensen, each the author of a system of dogmatics, were called the epigoni of speculative theology; the ingenious R. Rothe, whose "Christian Ethics" has been called the most important theological work of Germany since the publication of the "Dogmatics" of Schleiermacher, designated himself as a theosophist; Hase, the church historian, is a prominent representative of speculative rationalism. Speculative theology itself is still in a course of active development. Schelling's "Philosophy of Mythology and Revelation" (the exposition of his second philosophic system, published only after his death) aimed at a fuller reconciliation between speculative theology and the Christian revelation, and to prove the absolute universality of the Christian principles; while on the other hand T. H. Fichte ("Speculative Theology"), O. Ph. Fischer ("Idea of the Deity"), Weiss ("Idea of the Deity"), Wirth ("Speculative Idea of the Deity"), and others, established, in opposition to the pantheistic tendencies of Hegel, the system of speculative theism (*Panentheism*), in which they hope to bring about a reconciliation between deism and pantheism.—In opposition to the rationalistic and speculative theology, as well as to the vague supranaturalism of the 18th century, there developed itself at the beginning of the present century a school which demanded a restoration of the original theology of the Reformed churches, and a return to the strict orthodoxy of the symbolical books. One of the first manifestations of this school was the publication of the

95 theses of Olaus Harms of Kiel, in 1817; later it received an influential organ in the "Evangelical Church Gazette" of Hengstenberg, and on many sides it was demanded that all the ministers and theological faculties of the established churches should be pledged to a strict conformity with the symbolical books. It was, however, almost exclusively a Lutheran orthodoxy which was thus restored. Its principal theologians are Hengstenberg, Hävernicks, Keil, Kliefoth, Kahnis, Rudelbach, Guericke, Delitzsch, with a host of others; its theological organs are the "Journal of the Lutheran Theology and Church," by Rudelbach and Guericke, the "Journal of Protestantism and the Church," by the theological faculty of Erlangen, and the "Church Journal," published by Kliefoth and Meier. This revived Lutheran theology, however, soon split into an old and a new Lutheran school; some of the latter, in particular the professors Hoffmann and Thomasius of Erlangen, were charged with having introduced into the Lutheran theology the most dangerous innovations; and finally another party, likewise proceeding from the new Lutheran school, and counting among its leaders Vilmar, Löhe, and Münchmeyer, were suspected of leaning in the doctrine of the church toward the Catholic theology. There were also not wanting theologians who, though not sharing with the Lutheran schools the strong attachment to the symbolical books, yet united with them in the defence of the Bible as the only rule of faith, and of an unaltered biblical theology. Among them Tholuck is best known. The rise of new denominations in Germany has as yet not had an influence on German theology; only Irvingism has found a representative (Thiersch) among the leading theologians of Germany.—As the above sketch traces only the development of theology as a system, it must be remarked, in conclusion, that in every single department of German theology an exceedingly voluminous and thorough literature has been produced, and that some branches of theology have been cultivated almost exclusively in Germany.—The history of Christian doctrines has become in late years a particular branch of German theology. Among the numerous works we mention the *Dogmengeschichten* of Augusti (4th ed., 1884), Münscher, Baumgarten-Crusius, Hagenbach, Meier (new ed. by G. Baur, 1864), F. O. Baur, Beck, Marheineke, Strauss, and Noack. The most complete work on the history of German theology during the last 25 years is by Karl Schwarz: *Zur Geschichte der neuesten Theologie* (8d ed., Leipsic, 1858). A survey of the best works in every department of German theology may be found in Hagenbach's *Encyclopädie und Methodologie der theologischen Wissenschaften* (Leipsic, 1833). Winer's *Handbuch der theologischen Literatur* (8d ed. 2 vols., Leipsic, 1838) contains a complete list of all the theological works of Germany.

GERMANICUS CÆSAR, a Roman general, born in Rome in 15 B. C., died near Antioch in

A. D. 19. He was the son of Claudius Nero Drusus and Antonia, the daughter of the triumvir Antony, and was adopted by his uncle Tiberius in accordance with the will of Augustus. In A. D. 7 he accompanied Tiberius against the rebels of Dalmatia, served with distinction during 3 campaigns, and on his return to Rome was rewarded with a triumph, and with the hand of Agrippina, granddaughter of Augustus. At the close of another campaign, in A. D. 11, he was made consul, and in the following year was placed in command of the 8 legions on the Rhine. He was absent in Gaul when upon the death of Augustus (A. D. 14) a universal sedition broke out in the army. He was a favorite with the soldiers, and they had already determined to raise him to the head of the empire, when he suddenly returned to the camp, and at the peril of his life and by an admirable firmness succeeded in repressing 2 successive revolts and in establishing Tiberius upon the throne. He immediately marched the pacified legions against the enemy across the Rhine, and routed the Marai, whom he fell upon by night as they were celebrating a festival. Soon after appointed commander-in-chief of all the legions of Germany, he began that series of exploits which gained him his title of Germanicus. He marched against the native hero Arminius (Hermann), the conqueror of Varus, and defeated him, making his wife Thusnelda prisoner. He then penetrated to the Teutoburg forest, north of the Lippe, the scene of Varus's disaster, and rendered the honors of burial to the whitened bones of the legionaries that had fallen there. Yet Arminius hovered about the Roman army in impracticable places, attacked it in a narrow pass, and drove it into a marsh with so great loss that Germanicus decided to retreat to the Rhine. In A. D. 16 Germanicus returned against the Germans with a fleet of 1,000 vessels, landed his forces at the mouth of the Ems, crossed the Ems and the Weser, and defeated Arminius first on the plains of Idistavisus and then in the vicinity of Minden, but was again obliged to retreat, and lost a part of his fleet in a storm, after he had reached it with difficulty. He purposed to pursue his advantages in the following year, when Tiberius, jealous of the glory attached to his name, recalled him, and in the triumph which was granted him Thusnelda figured among the captives. To rid himself of Germanicus, the emperor sent him to the East to fight the Parthians and to pacify Armenia. He at the same time gave the government of Syria to Cneius Piso, a man of violent and haughty character, with secret instructions to thwart and annoy Germanicus. The latter calmed the disturbances of the East in spite of the intrigues of his enemies, but suddenly fell ill and died at Antioch. Agrippina brought his ashes to Italy amid universal mourning; honors almost unexampled in Roman history were paid to his memory; and Piso, accused by the senate of having poisoned him, anticipated his condemnation by a voluntary death. Germanicus is



the hero of the "Annals" of Tacitus, and is one of the noblest characters in the history of the Roman empire. He had reputation also as an orator and poet, but of several works which he composed there remains only a Latin translation of the *Phænomena* of Aratus, which is superior to Cicero's translation of the same work.

GERMANY (Germ. *Deutschland*; Fr. *Allemagne*), the name given to a large portion of central Europe, composed of numerous independent states, and parts of states, united together by a common league, called the Germanic confederation, embracing the river system of the Elbe and Oder, and large portions of the systems of the Rhine, Danube, and Vistula. It extends from the southern point of the Istrian peninsula on the Adriatic (lat.  $44^{\circ} 50' N.$ ), over 10 degrees 5 minutes of latitude, to the lake of Zarnovitz on the boundary of Pomerania and western Prussia, and over 18 degrees 40 minutes of longitude from the westernmost point of the duchy of Limburg, long.  $5^{\circ} 37' 21'' E.$ , to the eastern boundary of Silesia, long.  $19^{\circ} 17' 21'' E.$  The boundary line marked off by these extreme points has a length of about 4,600 miles, and encloses an area of about 244,000 sq. m. (The area of 280,000 sq. m., given by some authorities, includes the eastern provinces of Prussia lying beyond the limits of the German confederation.) The natural boundaries are, on the N., the German ocean (North sea), the Eider river, and the Baltic sea; on the E., the water-shed of the Oder and Vistula rivers, and the lesser Carpathians; on the S., the Alpine system and the Adriatic; on the W., the water-shed of the Rhine, the Moselle, and the Meuse. Politically Germany is bounded N. by Denmark; E. by Prussian, Russian, and Austrian Poland, Hungary, and Croatia; S. by Italy and Switzerland; W. by France, Belgium, and Holland. Stretching from the lofty summits of the Alps to the low beaches of the Baltic, from the picturesque and diversified countries of western Europe to the monotonous steppes of the east, Germany encloses a rich variety of mountainous regions, terraced country, table-lands, and fertile plains. Though mainly an inland country, it is not devoid of a coast configuration which, if less favorable to a large development of maritime commerce, furnishes good outlets to its numerous navigable rivers. Two river systems, tributary to the North sea and the Black sea, meet in Germany, rendering it the centre of the interior commerce of the European continent. Its climate unites the different characteristics of the surrounding countries, holding a mean between the extreme heat of the south and the extreme cold of northern Europe, between the excessive moisture of the western coast countries and the dryness of the eastern plains. Since the time when Germany ceased to be a conquering nation, the preservation of its political status has always been considered the principal element of the balance of power in Europe. In that respect it is the keystone of the political

system of Europe. Owing to its important central position, Germany has almost invariably become the theatre of all great European wars, no matter where or for what cause begun. Beside, its boundaries, with the exception of the southern, are but poorly protected. On the W. its former principal defensive positions against France, viz., the Netherlands, Alsace, and Switzerland, have been lost. On the central portion of the Rhine France cuts deeply, almost at a right angle, into Germany, and the valleys of the Main and Kinzig rivers form an easy road for a French invading army. Hence 6 strong fortresses, Mentz, Coblenz, Luxemburg, Saarlouis, Landau, and Germersheim, cluster there as bulwarks against French invasion, while a similar number of equally strong fortresses on the French side would appear to be intended more for aggression than defence. On the S. E. Germany is protected by the maze of the projecting spurs of the Alpine system and the mountainous character of Bohemia. The weakest point of Germany is the E. and N. E. frontier toward Russia. There the Russian territory enters like a wedge into the side of Germany, and the three fortresses of Posen, Thorn, and Königsberg could scarcely offer any successful resistance to an invading army from Russia. Nevertheless the defensive military power of united Germany would be so strong as to deter all attempts at conquest, and it is not only the boast of the Germans, but also believed by their neighbors, that Germany as a united nation would be fully able to cope with both France and Russia simultaneously. But Germany as a unit has always been a chimera. To the diversified physiognomy of its vast territory corresponds a political division scarcely less variegated. It has been said by an eminent German statesman that Germany is not a nation, but merely a geographical designation. Indeed, the tie connecting the different members of its political body is so weak as to be of very little utility. Practically, Germany appears only as a vast conglomerate of a multitude of petty states, half a dozen states of the second or third rank, and two great European powers, both of which have large possessions beyond the limits of Germany proper. Germany has never been a centralized nation, and it is a significant fact that its precise centre is cut up into the pettiest and weakest principalities. Even during the middle ages, when Germany was at the zenith of its power, in fact the ruling nation of Europe, political power always rested with the limbs, not with the main body of the empire. Since the time of the reformation, Germany has almost incessantly been rent by a dualism deeply rooted in the national and individual peculiarities of the northern and southern sections. Northern Germany, grouped around Prussia, is the representative of the highest development of mental culture, and the diversification of human labor; while southern Germany has been slow in the development of intellectual culture, more prone to conquest by force of arms, and



less so to that higher form of conquest which consists in the subjection of nature to the wants of mankind and the fullest development of natural resources.—The population of Germany, according to the latest complete census (Dec. 1855), was 43,935,500, or 180 to the square mile, showing an increase within the 12 years preceding of 0.6 per cent. per annum (in 1848, 41,054,702). The density of population was, in 1801, 112 to the square mile; in 1816, 125; in 1837, 140; and in 1848, 168. The 4 free cities excepted, the greatest density of population prevails in the kingdom of Saxony (348 to the square mile), the grand duchy of Hesse (264), and the duchy of Saxe-Altenburg (256). In the following states the density of population exceeds the average: Hesse-Cassel, Württemberg, Baden, the Prussian provinces belonging to the German confederation, Luxemburg, Nassau, Brunswick, Saxe-Coburg-Gotha, Schwarzburg, Reuss, Lippe, Hesse-Homburg, Saxe-Weimar. The average density of the German provinces of Austria is 170, of Bavaria 154, and of all the other states less than 140 (Hanover 122, the lowest average). The proportion of the inhabitants of cities to the rural population is in the general average as 1 to 8; in Prussia as 2 to 5, in Saxony as 1 to 2. The number of large cities is, proportionately to the population, larger in Germany than in any other country, Great Britain, Belgium, and Holland only excepted. There are 2 cities with over 400,000 inhabitants each (Vienna, 478,000, and Berlin, 426,602, not counting the garrisons); 6 with more than 100,000 and less than 150,000 inhabitants (Breslau, Prague, Munich, Hamburg, Dresden, Cologne); 12 with 50,000 to 100,000 inhabitants (Leipsic, Frankfort-on-the-Main, Bremen, Magdeburg, Stettin, Aix la Chapelle, Trieste, Brunn, Grätz, Nuremberg, Stuttgart, and Hanover); over 100 cities with from 10,000 to 50,000; about 200 with from 5,000 to 10,000; nearly 2,000 with less than 5,000 inhabitants; about 3,000 boroughs and 112,000 villages. Four-fifths (80.8 per cent.) of the population of Germany belong to the German race; the remaining fifth, belonging principally to the Slavic race, is mainly confined to the Austrian and eastern Prussian provinces. If these are left out of account, full 98½ per cent. of the German people belong to the same Teutonic stock. The entire number of Slavi in Germany is a little over 7,000,000, or 16.75 per cent., of which number there are only about 50,000 outside of Prussia and Austria. The number of Jews is about 440,000, or 1 per cent. of the total population. They are very unequally distributed. While scarcely any reside in Upper Austria, Styria, Carinthia, Carniola, and Tyrol, and in the Prussian province of Saxony they are only ¼, and in Saxony ½ per cent., they are 8 per cent. of the population of Hamburg, Frankfort, and Hesse. The Romanic population in Tyrol and Illyria number about 400,000, the Flemings in Rhenish Prussia and Luxemburg about 200,000, Greeks (in Austria) some 3,000, gypsies over

1,000, principally in Austria. The Germans are usually classified into low Germans and high Germans, or northerners and southerners. The dividing line may be drawn from lat. 50° 30' N. in western Germany to lat. 52° 30' N. on the eastern frontier, or along the course of the Sieg (a tributary of the Rhine) to the southern slope of the Hartz mountains, crossing the Elbe near its confluence with the Saale, then a little to the northward along the southern banks of the Havel and of the Warthe. In physical development the Germans stand superior to either the Latin or the Slavic race. Their frame and their muscular development are strong, almost heavy. Among the lower classes of the rural and laboring population stoutness and strength often approach to clumsiness, which is heightened sometimes by a servile bearing, and a certain uneasiness and want of self-reliance. As a general thing the northerners are taller and of better shaped features and limbs than the southerners. The blonde complexion prevails only in the north; in central and southern Germany light or dark brown is more frequently found. In power of endurance the Germans are surpassed by the Slavic race, in agility by the Latin. The prominent features of the German national character are honesty, faithfulness, valor, thoughtfulness, perseverance, and industry. The German is patient, conservative, inoffensive, and hence always ready to allow himself to be deceived by vain promises of his rulers. He favors a moderate enjoyment of the pleasures of social life, but sometimes, or it should rather be said in some portions of Germany, this is carried to excess, and the complaint has been heard that popular movements in favor of liberty have unfortunately been drowned in the social cup. Of a scientific turn of mind, the Germans have largely promoted the progress of human knowledge. In point of fact, there is scarcely a single branch of science in which Germans have not excelled. Again, in music, painting, and sculpture they occupy one of the highest ranks among nations. The German artisan is highly valued for his dexterity and steadiness. Yet there is one element almost entirely wanting in the German character, viz., a strong national feeling. The German rather boasts of being a cosmopolitan, while in fact his cosmopolitanism would appear to be only a confession of weakness and pliability. The German differs from the natives of all other European and American countries in this respect, that he is in many instances more favorably inclined toward other countries than his own. If proverbs are indicative of the sentiments of the people, it is hardly creditable to the patriotism of the Germans that they are wont to call those things which they deem of little value, "things that have not come from afar." Some German authors contend that these peculiar traits of the national character are merely fruits of the political condition of the country; but they result more probably from an abstract idealism with which the majority of Germans would seem to

be imbued. Among the multitudes of emigrants whom Germany sends forth to other continents, there are many thousands with whom the motive for voluntary expatriation is not social or individual misfortune, but merely a visionary longing after an ideal state of society. The sectional and local diversities of character are very great in Germany. While the Protestant northerners have many characteristics in common with the Anglo-Saxon, the Catholic southerners approach in some important respects the Latin race, particularly in a certain preponderance of imagination over reason. The low German assimilates far more readily to the English or American than to the Austrian or Swabian. In fact, the political division of Germany has, in its general features at least, a firm foundation in the diversities of the popular character by which a centralized form of government for the whole country would seem to be rendered all but impossible.—The vertical configuration of Germany presents 8 principal groups, viz.: 1, the Alpine region, S. of the Danube, comprising about 45,000 sq. m.; 2, the elevated and terraced central portion, over 100,000 sq. m. in extent; 3, the level northern country, comprising about 100,000 sq. m. 1. The principal chain of the German Alps extends from W. to E. nearly along the 47th parallel of latitude, bearing the names of Rhaetian Alps and Noric Alps, the former sending a branch to the northward (Algau Alps), the latter being subdivided into the Trentine, Salzburg, Styrian, and Austrian Alps, and branches off to the N. N. E. in the Wienerwald (Viennese forest). The western portion of this mountain system (Tyrol) rises in gigantic and precipitous masses, and is distinguished by the sombre grandeur of its scenery. It culminates in the Ortelles peak and the Groes-Glockner (12,218 feet according to the latest statements), the highest mountain of Germany. The Inn, Salza, Enns, Adige, and Drave rivers rise from this section of the Alps. The eastern section, the physiognomy of which is determined by the valley of the Mur river, offers less striking features of mountain scenery, and few of its highest elevations attain the limit of perpetual snow. To the S. the Noric Alps gradually slope toward the plains on the northern bank of the Drave. On the other bank of the river the ridge of the Carnic Alps forms a water-shed between the Drave and the Save. Again, between the Save and the gulf of Trieste the Julian Alps stretch in a S. E. direction from the western portion of Illyria toward Dalmatia. 2. The terraced country of central Germany E. of the Rhine has its nucleus near the junction of the boundaries of Saxony, Bohemia, and Bavaria, about lat. 50° N., in the Fichtelgebirge, the water-shed of the tributaries of the Rhine, Danube, and Elbe. Thence a number of mountain chains of the secondary order radiate in all directions. To the S. E. the Bohemian forest runs nearly 150 miles in parallel rugged chains toward the Danube,

where it terminates abruptly opposite Lintz. Its highest elevation is the Great Arber, 4,650 feet high. To the N. E. the Erzgebirge, the loftiest peaks of which rise to an elevation of 4,000 feet, forms the frontier between Bohemia and Saxony. On the right bank of the Elbe they cluster in a group of sandstone mountains (Saxon Switzerland and Lusatia); after which, assuming the name of Sudetic mountains (Riesengebirge, Glatzerlebirge), they turn S. E., dividing Bohemia from Silesia, and extending to the head waters of the Oder, where they meet the Carpathians. They culminate in the Schneekoppe, 4,960 feet high. Nearly parallel to the Erzgebirge, from the point where the Bohemian forest approaches the Danube to the Glatzer section of the Sudetic mountains, run the Moravian mountains. Thus Bohemia, enclosed between 4 high mountain ridges in the shape of a parallelogram, appears as a vast hilly basin, or, in a historical aspect, as an immense fortified *place d'armes*, the command of which has at all times been considered essential in the wars of conquest fought upon German soil. To the S. E. of the Fichtelgebirge the Franconian Jura sweeps to the Danube and along its northern bank in a westerly direction into Württemberg, where its long stretched, sharply defined ridges and table-lands are known by the names of Raube Alp, Swabian Alp, Aalbuch, &c. In the S. W. corner of Germany (grand duchy of Baden), near the head waters of the Danube, the mountain ridge of the Black forest sets off at a sharp angle from the Swabian Alp in a northerly direction, nearly parallel to the Rhine, and skirting the fertile bottom-land of its E. bank. The spurs of this ridge, extending as far N. as the Neckar river, there meet with the Odenwald (grand duchy of Hesse), which, by the Spessart and Rhön (N. W. frontier of Bavaria), and again by the Thuringian and Franconian forests, is connected with the Fichtelgebirge. The territory enclosed by these different ridges, being those sections of Bavaria and Württemberg N. of the Danube, nearly the whole of Baden, part of the grand duchy of Hesse, and a few of the petty Saxon duchies, is intersected by a number of lesser hill chains. Between this Franconian and Swabian mountain system and the Rhaetian Alps of Austria there extends a vast level plain (southern Bavaria), bounded by the Danube to the N., the Iller to the W., the Inn and Salza to the E. The N. W. section of central Germany—always taking the Fichtelgebirge as the centre—appears like a labyrinth of hill chains, few of which, however, attain a considerable elevation. The more important of them are: the Werra mountains, the Habichts-Wald (Hesse-Cassel), the Eder hills, Egge hills, Rothhaar hills, the Haarstrang (Prussian Westphalia), the Westerwald, and Die Höhe or Taunus (Nassau). These are all situated between the Rhine on the W., the Main and Kinzig rivers on the S., the Werra on the E., and the Lippe on the N. The highest summit is the Astenberg in Westphalia.

lia, 2,586 feet high. To the N. of the Lippe only one other hill chain stretches in a N. W. direction nearly parallel to the Ems, viz., the Teutoburg forest, renowned in the history of Germany as the theatre of the conflict by which the rule of the Romans east of the Rhine was broken. East of the Weser the Weser hills run parallel to that river, while S. E. of them and N. of the Thuringian system the Hartz appears as an isolated mass of mountains, the highest summit of which (Brocken) reaches the height of 8,508 feet. On the left or western bank of the Rhine the northern spurs of the Vosges, extending into Rhenish Bavaria and Rhenish Prussia, are called the Haardt, the Hochwald, and the Hunsrück (1,800 to 2,000 feet high). Further N. the Ardennes send into Rhenish Prussia the ridge of the Eifel (1,800 feet high) and the Höhe Venn. 8. The great plain of northern Germany extends over the entire breadth of the country N. of a line drawn from the Holland and Oldenburg frontier to Osnaburg and Minden, thence E. S. E. to Leipzig, thence S. by E. to a point where the head waters of the Oder and Vistula approach one another. This vast plain, which at some former geological period has undoubtedly formed the bottom of the sea, is traversed only by two ridges of hills, none of which rise above 400 feet. One of these ridges extends from the lower Vistula W. to the Oder above Stettin; the other from Tarnowitz in Silesia S. of Breslau along the Oder to lat. 52° N., then a little to the N. of that parallel through the Prussian provinces of Brandenburg and Saxony into Hanover.—Each of the 3 seas by which Germany is bounded has a peculiar coast configuration. While the coast of the North sea or German ocean is largely indented by deep bays (Dollart and Jade bays) or wide embouchures (Weser and Elbe), and its "marshes" are the richest and most fertile soil in all Germany, the shores of the Baltic form many extensive lagoons (Haffs), and are generally uninviting and sterile. The shores of the Adriatic sea are steep cliffs and bluffs, with two excellent inlets, the bays of Trieste and Fiume, both of them of the utmost importance to the commercial interests of Germany. All together Germany has a coast line of 1,380 miles, viz.: 830 on the Baltic sea, 270 on the North sea, and 280 on the Adriatic. The advantages which the formation of the shores of the North sea would seem to offer to the development of the maritime interests of Germany, are to a great extent neutralized by the fact that a series of sand banks, called *Watten*, stretch nearly all along the coast. Beside this, the island which commands the entrance of all German ports on the North sea (Helgoland) has been ceded to Great Britain.—The diversified surface of Germany is intersected by many rivers. Their total number, not including the small creeks, is 500, 60 of which are navigable by nature and several others by means of slack water canals. The principal river systems are those of the Danube, Rhine, Weser, Elbe, and

Oder. The Danube, flowing from W. to E., has within Germany a length of 600 m., and its river system an area of over 72,000 sq. m. Its principal tributaries are on the left or N. bank, the Altmühl, Nab, Regen, and March; on the right bank, the Iller, Lech, Isar, Inn and Salza, Traun, Enns, and Leytha, all within the limits of Germany, beyond which it still receives the waters of the Mur, Drave, and Save. The North sea receives the river systems of the Rhine (over 500 m. within Germany, and with a territory of over 45,000 sq. m.), the Ems (235 m. in length, 5,000 sq. m. of territory), the Weser (377 m. and 17,500 sq. m.), and the Elbe (700 m. and 55,000 sq. m.). The principal tributaries of the Rhine are the Nahe and Moselle on the left bank; the Kinzig, Murg, Neckar, Main, Tauber, Lahn, Sieg, Wipper, Ruhr, and Lippe on the right. The Weser is formed by the confluence of the Werra and Fulda, and receives only a few tributaries (Werre, Aue, and Hunte on the left, Aller and Leine, Ocker, Wumme, and Geeste on the right). The Elbe has, next to the Danube, the largest river system. Its affluents are the Moldau, Eger, Mulde, Saale, Elster, Ohre, Aland, Jetze, Ilmenau, Schwinge, and Oste on the left bank, the Isar, Black Elster, Havel and Spree, Stecknitz, Elde, and Stör on the right bank. The territory drained by the rivers which flow into the Baltic sea has an area of 40,000 sq. m., of which two thirds belong to the system of the Oder (616 m. in length), and its numerous tributaries, the Oppa, Neisse, Weistritz, Katzbach, Bober, Welse, Ucker, and Peene on the left, the Ostrau, Olsa, Klodnitz, Malapane, Weide, Bartsch, Warta, Plöna, and Ihna on the right. Of the small river systems the following may be mentioned: the Eider (boundary between Germany and Denmark), 115 m. in length, with 4,000 sq. m. of territory; the Pomeranian rivers Rega, Persante, Wipper, Stolpe, Lapow, and Leba, with an aggregate territory of over 8,000 sq. m.; the Vistula, which in Germany has a length of only 55 m. and a territory of 620 sq. m.; the Adige (Etsch) and Isonzo, both emptying into the Adriatic sea (the Adige without, the Isonzo within Germany), and draining together an area of 8,000 sq. m. A number of canals connect several of the large river systems, but only a few of them can compare with the American canals. The most important is the Ludwigs canal, connecting the Danube with the Main (and through this with the Rhine), thus furnishing an uninterrupted navigation from the North to the Black sea. It has a length of 95 m. with 103 locks, and its cost of construction has been over \$4,000,000. The Bremervörde canal connects the Oste and Schwinge, tributaries of the Elbe; the Kiel canal connects the North and Baltic seas by the Eider, and the Stecknitz canal furnishes an outlet from the Elbe into the Baltic by the Trave; by the Finow and Mühlrose canal the river systems of the Elbe and Oder are connected.—The number of lakes in Germany is large, but most of them are inconsiderable. The following deserve to be

mentioned: the lake of Constance (Bodensee), the banks of which belong to 5 different states, Baden, Württemberg, Bavaria, Austria, and Switzerland; the lake of Garda, a small part of which only belongs to Germany; Achen lake, Tyrol; Zeller and Wolfgang lakes, Styria; Atter and Traun lakes, Austria; Staffell, Ammer, Würm, Tegern, Ohliem, and Königs lakes, Bavaria; Feder lake, Württemberg; lake of Steinhude (*Steinhuder Meer*), in Hanover and Lippe; Zwischenahner Meer, Oldenburg; the lakes of Plön, Kell, Seelent, Westen, and Grub, in Holstein; lake of Ratzeburg, Lauenburg and Mecklenburg; the lakes of Schwerin, Plau, Malchin, Flesen, Kalden, and Müritz, in Mecklenburg; Schwieloch and Scharmtz lakes, Brandenburg; the lakes of Madde, Damm, Papenzin, and Plön, Pomerania; Zarnovitz lake, in Pomerania and western Prussia; the Salt lake near Eisleben, in the Prussian province of Saxony; the lake of Laach, in Rhenish Prussia.—The climate of Germany is temperate, and, considering the extent of the country, remarkably uniform, the greater heat of the lower latitudes being tempered by the greater elevation of the country and its Alpine character. The limit of perpetual snow is in different parts of Germany from 7,300 to 8,000 feet above the level of the ocean. On the great plain of northern Germany the districts exposed to the moist W. and S. W. winds have a more inclement climate than central Germany; while the southernmost districts, though drier than the northern, have less heat than more northern latitudes. The average decrease of the mean temperature, going from S. to N., is 1° F. in 52 m., and going from W. to E. 1° F. in 72 m.; measured by the vertical elevation, it is 1° F. in 256 feet. The mean annual temperature of Goritz in Illyria (lat. 45° 56' N., long. 13° 37' 32" E.) is 59° F.; the mean temperature in summer 78.4°, in winter 37°. The mean annual temperature of Stralsund (lat. 54° 18' N., long. 18° 5' 33" E.) is 46.4° F.; the mean temperature in summer 68°, in winter 29.8°. The mean annual temperature of the valley of the Rhine is 52°, of Thuringia 47.5°, of Silesia 47°, of all Germany 48.8°. The extremes of temperature in the country N. of the Alps are 95° F. above and 81° below zero. In an average of 10 years the Rhine had been frozen over 26 days during each winter, the Weser 30 days, Elbe 62 days, Oder 70 days. The atmosphere is pure and wholesome, unfavorable to the development of endemic or hereditary diseases, except in the high Alpine valleys, where cretinism prevails. Epidemics generally appear in a less destructive form in Germany than in the neighboring countries. Of wild animals, the deer, hare, rabbit, fox, hamster (a kind of marmot peculiar to Germany), marten, badger, weasel, otter (rare), &c., are found nearly everywhere, stringent game laws preventing their destruction. Chamois, ibex, and bears are met with in the Alps, the last two rarely; wolves in the Alps E. of the Oder and W. of the Rhine. As to domestic animals, a good breed

of horses is raised in Mecklenburg, Holstein, and Hanover; cattle raising is a most important branch of husbandry in Oldenburg, the N. W. part of Hanover, Franconia, and the Alpine country; sheep are raised extensively in Saxony, Silesia, and Brandenburg; Saxony furnishes the finest quality of wool; goats, mules, and asses are reared principally in the mountainous districts of the south; hogs in all states, but chiefly in the west. Large birds of prey (the eagle and vulture) are rarely found beyond the Alpine districts; fowl of all kinds, wild and domestic, are plentiful in all parts of the country. The pheasants of Bohemia are celebrated; canary birds are raised in large numbers in Tyrol. Of amphibia Germany has only a limited number of species; of snakes there are only 2 venomous kinds, *vipera berus* and *V. chersea*. The different species of fish found in Germany number 110, of which 60 inhabit exclusively the ponds and lakes. Carp and pike are numerous in nearly all rivers and ponds, the salmon only in the larger rivers; sturgeon, cod, and sheatfish in the Elbe, trout in all mountain streams; herring and sardines in the Baltic and North sea. Oysters of good quality are obtained near the shores of Holstein, pearl muscels in some rivers of the interior. The silkworm is not raised on an extensive scale.—Germany is rich in mineral products, and mining has employed there a great number of persons from the remotest times. Gold is found only in a few places in limited quantities (in the Hartz mountains, Salzburg, and Tyrol), but silver abounds in the mountain ranges which diverge from the Fichtelgebirge in a N. E. direction, also in the Hartz mountains, in southern Westphalia and Styria. An extensive quicksilver mine, one of the largest in the world, is worked at Idria in Illyria. Copper is mined principally in Tyrol and Styria. Iron is found in large quantities in nearly all the mountain ranges; the best qualities are those worked in Styria, Westphalia, and Rhenish Prussia. Tin of an excellent quality abounds in Bohemia and the Erzgebirge; lead in Carinthia, Styria, Saxony, Bohemia, and Upper Silesia; calamine and zinc in Silesia; cobalt in Saxony. Salt is obtained in quantities more than sufficient for domestic consumption in all the states except Saxony, Nassau, and Anhalt. The production of coal has been enormously increased within the last 20 years. The most extensive coal beds occur in Rhenish Prussia, Westphalia, Upper Silesia, Saxony, Bohemia, and Styria. The N. W. districts have, instead, an abundant supply of peat for fuel. Sulphur, saltpetre, alum, vitriol, gypsum, chalk, ochre, emery, porcelain clay, graphite, marble, alabaster, and amber (on the shores of the Baltic) are found in larger or smaller quantities in different districts. Precious stones are comparatively scarce. Of mineral springs Germany possesses a great number, and several of them enjoy a world-wide reputation for their sanative virtues.—The soil of the country is, on the whole, only of moderate fer-

tility. If there are many tracts exuberantly productive, there are as many others almost as barren and sterile as the Russian steppes. Nay, a large portion of the northern level country would be less fertile even than they, if it had not the advantage of abundant rains. The most fertile tracts of land in Germany and in Europe are the marshes on the shore of the North sea. Rational agriculture has improved the natural condition of the soil in a high degree.—The vegetable kingdom numbers 8,418 species of phenogams (890 trees and shrubs, 2,170 perennial, 169 biennial, and 684 annual plants), and 4,806 species of cryptogams (78 ferns, 585 mosses, 112 liverworts, 2,490 fungi, 670 lichens, and 876 algae). All kinds of grain and fruit belonging to the temperate zone are raised in Germany: rye, barley, oats, potatoes, peas, and beans, everywhere; maize principally in the S.; wheat in the S. and W.; buckwheat in the N.; millet in the S. E.; rapeseed, poppy, anise, and cummin in the central and N. W. districts. The largest grain fields are in Württemberg, the smallest in Mecklenburg. Moravia, Bavaria, Württemberg, Saxe-Altenburg, Mecklenburg, Holstein, &c., produce a larger quantity of breadstuffs than is required for home consumption, while Tyrol, Lower Austria, Saxony, and some of the Saxon duchies are importers of breadstuffs. Flax and hemp, madder, woad, and saffron are cultivated more in the S. and central region than in the N. Tobacco is extensively raised (even for exportation to other tobacco-growing countries) on the upper Rhine, the Werra and Oder, and in Brandenburg. Hops of an excellent quality are furnished by Bohemia, Bavaria, and Brunswick. Beets are used in enormous quantities for the manufacture of beet sugar, and their cultivation has almost entirely superseded the grain culture in the Prussian province of Saxony, Anhalt, Hesse-Darmstadt, S. Bavaria, and Bohemia. Chicory, as a substitute for coffee, is raised in the country between the Elbe and Weser rivers. In garden culture Württemberg, Bavaria, Hesse, and the Saxon duchies hold the highest rank. The fruit raised on the banks of the Rhine and Neckar, in Saxony and N. W. Bavaria, is of the very best quality to be found anywhere. Peaches and figs ripen only in localities protected from the cold. The apples of Bohemia and Saxony are of the choicest kind, and are exported to Russia in large quantities. Marron chestnuts, almonds, &c., are raised in the S. W. states; oranges, figs, pomegranates, lemons, &c., only in Tyrol and Illyria. Great attention is paid to the improvement of fruit. In all the states there are pomological societies, which from time to time hold national conventions. The culture of the vine extends to lat. 51° 30' N.; the best wine-growing districts are the valleys of the Rhine and Danube, Neckar, Main, and Moselle. The best qualities are raised in the district between Mentz and Bingen on the right bank of the Rhine (Johannisberger, Steinberger, Geisenheimer, Hattenheimer, Hochheimer—ab-

breviated in English, Hook—and Rüdesheimer), in the grand duchy of Hesse (*Liebfrauen-Milch* at Worms and Niersteiner), and in the Palatinate (Forster, Deidesheimer, Dürkheimer). In the valley of the Main the Würzburg wines are equal to the best qualities of Rhine wine. Lighter wines of a good quality are raised in the valleys of the Moselle, Aar, and Neckar, also in Bohemia (Melniker and Aussiger), in Moravia, Styria, and Tyrol. A very inferior quality is raised in Saxony (Meissen and Naumburg) and in Silesia (Grünberg). Altogether the vineyards of Germany cover an area of nearly 510,000 acres, and the value of the crop in favorable seasons comes near \$25,000,000. The physical culture of Germany is highly developed, and inferior only to that of England. The products of agriculture have been nearly doubled by the introduction of more rational methods of cultivation since 1816. All German states possess agricultural colleges, some of which enjoy a world-wide reputation. The methods of cultivation are, however, different in different portions of the country. The triennial and quadrennial rotation of crops are most in use. According to the first method, winter grain is raised in the first year, spring grain in the second, and potatoes, pulse, or fodder in the third year; according to the second method, recommended by Thäer, a grain crop is always followed by a crop of fodder or pulse. In some of the northern states crops of grain are raised upon a certain portion of the farm for several successive years, after which the field is allowed to lie fallow for 3 to 7 years according to the number of lots into which the farm is divided. In Mecklenburg agriculture approaches to horticulture, inasmuch as many different kinds of fruit are raised on little plots of ground, one by the side of another.—The culture of forests is carried on in Germany on a more scientific basis than in any other country. Having in former times thoughtlessly wasted their wealth in forests, many German states have been compelled to replant them in order to satisfy the wants of agriculture and industry. In many states the forests mostly belong to government, and are as carefully kept as gardens; but even private owners are prohibited by law from wasting their forests without regard to the public good. The most extensive forests are found in central and southern Germany and in the eastern provinces of Prussia. The entire superficies of woodland in Germany is 88,500,000 acres, of which Austria has 16,000,000, Prussia 10,200,000, Bavaria 5,400,000, Hanover, Württemberg, and Baden about 1,250,000 each.—Of all European countries, Germany has the oldest manufactures. Within the last century it has fallen in regard to the extent of its mechanical pursuits behind England and Belgium, but within 20 or 30 years it has advanced rapidly, and is now in a fair way to recover its former position. As early as the 18th century Germany was celebrated for its cloth and linen manufacture, its glass wares, carved and chis-

elled wares, &c. In the 14th century the silk manufacture was introduced, and the first paper mill was established as early as 1390. During the 15th century Germany became celebrated for its watch manufacture. Printing works were established at Augsburg and the lace manufacture introduced into Saxony in the 16th century. At that time Germany was to Europe, in regard to industry and commerce, what England is now. The 80 years' war destroyed all prosperity for a long time. At the beginning of the 18th century German industry again flourished, principally in consequence of the immigration of the Huguenots expelled from France. Frederic II. of Prussia and Joseph II. of Austria strove to raise it to its former eminence, but the French revolutionary wars blighted it once more. Since then it has recovered the lost ground, principally by means of the *Zollverein*, a commercial union of the majority of states (without Austria), by which free commerce is established among all its members, while a high tariff protects their industry against foreign competition. The progress made by Germany under this system is truly remarkable. While 40 years ago it had preëminently become an exporter of raw products of the soil, it is now one of the principal exporters of industrial products and importers of raw materials. The centres of German industry are the kingdom of Saxony, Westphalia and Rhenish Prussia, Moravia, and Bohemia. The linen manufacture stands highest in Saxony, Silesia, and Rhenish Prussia. Cotton mills are numerous in all the *Zollverein* states. They required in 1858 1,109,190 cwt. of raw cotton and 577,527 cwt. of cotton yarn. The German provinces of Austria had in 1857, 164 cotton mills with 1,408,753 spindles. How the woollen manufacture of Germany has been increased by the *Zollverein* may be seen from the fact that in 1825 Germany exported to England alone 280,000 cwt. of raw wool, while in 1851 the quantity of woollen yarn imported into Germany amounted to 340,000 cwt., and the quantity exported to 90,000 cwt., leaving not less than 250,000 cwt. as the net import of raw material. In the same year the quantity of woollen cloth exported amounted to 120,000 cwt. The German silk fabrics equal in quality the French and English, but are somewhat inferior in design. The principal silk manufactories are in Prussia (Berlin, Elberfeld, and Crefeld), Austria (Vienna and Styria), and Saxony. The export of silk fabrics from Germany is nearly equal in amount to the domestic consumption. The paper manufacture has made considerable progress, although the finest qualities are still imported to some extent. Thirty years since Germany supplied the world with rags, and imported paper; in 1851 the net import of the former was 370,000 cwt., the net export of the latter 35,000 cwt. In some fabrics of wood, as the choicest kinds of cabinet furniture (Berlin and Vienna), and all kinds of toys, Germany stands unequalled, and is a large exporter to all countries of the world. The iron

manufacture has of late increased rapidly. In 1854, 2,193,889 cwt. of iron were mined in Prussia, and 3,881,169 cwt. in 1857, an increase in 4 years of 44 per cent. Still the consumption has increased in a higher ratio, there having been imported, in 1854, 2,650,308 cwt., and in 1857, 4,798,486 cwt., an increase of 80 per cent. The best iron and steel wares are manufactured in Rhenish Prussia, Saxony, Bohemia, and Styria. The machine shops of Prussia, Saxony, Bavaria, Baden, and Austria rival, if they do not excel, the largest establishments of their kind in England. In 1858 a machine shop at Berlin, established in 1837, turned out its 1000th locomotive. Other important branches of industry are gold and silver wares (Augsburg, Vienna, and Berlin), glass wares (Bohemia and Silesia), leather (Rhenish Prussia), porcelain (Saxony, Vienna, and Berlin), musical instruments (Vienna), geometrical and astronomical instruments (Munich, Vienna, and Berlin), clocks (Baden), &c. Brewing is one of the most extensive branches of industry, especially in Bavaria. The manufacture of beet sugar has increased wonderfully within the last 20 years. There were on May 1, 1857, in the *Zollverein* states, 232 beet sugar manufacturing establishments, which during the 9 months preceding had made 1,800,000 cwt. of sugar from 23,421,179 cwt. of beets. At the same time the Austrian provinces had about 50 establishments, producing 360,000 cwt. of sugar.—The foreign commerce of Germany is of great importance, the total value of the imports and exports being estimated at about \$800,000,000 per annum. To give exact figures is impossible, since the official tables of the two largest territories, the *Zollverein* and Austria, include the non-German provinces of Prussia and Austria respectively, and no trustworthy statements exist in regard to some of the smaller territories. Beside the Prussian customs union, which includes 26 states, and the Austrian (Austria and the principality of Liechtenstein), the following states have each different tariffs: Holstein-Lauenburg (incorporated into the Danish customs territory), the two grand duchies of Mecklenburg, Limburg (to Holland), and the Hanse towns Hamburg, Bremen, and Lübeck. The latter, with Trieste on the Adriatic sea, are the principal outlets of German commerce. Hamburg holds the third rank of all European ports, London and Liverpool only being superior to it. In 1856 the aggregate value of its imports and exports was, seaward, \$183,000,000, landward, \$198,000,000; but in this statement a large portion of the imports into Hamburg from Germany figures also among the exports to foreign countries, and *vice versa*. The value of goods exported of Hamburg manufacture exceeded in the same year \$10,000,000. Next follows Trieste, with an aggregate export and import in 1856 of \$120,000,000, and Bremen, over \$100,000,000. Lübeck, Stettin, and Altona are less important. Altogether the commerce of these ports is now 5 times as large as in 1816. The shipping of Germany, though large in numbers (over 15,000

vessels), is small in tonnage, the average being not more than 52 tons for each vessel. The principal articles of export are wool, hops, grain, cattle, linen yarn, skins and hides, glass ware, and antimony, to England; iron and steel wares, zinc, coal, lumber, hops, hemp, flax and seed, alcohol, and cattle, to France; grain, timber, coal, wine, leather, wool, metals, woollen and cotton fabrics, hosiery, hardware, china and glass ware, to Holland; wool, wine, and salt, to Belgium; grain, salt, and brandy, to Switzerland; seeds, fruit, preserves, and sugar, to Sweden and Russia; linen and cotton goods, ribbons, and hosiery, to Italy, Spain, and Portugal; wine, cotton, woollen, linen, and silk goods, hardware, glass ware, toys, &c., to America. The imports are, beside all kinds of raw materials (cotton, pig iron, copper, hemp, tallow, hair, bristles, potash, &c.), coffee, sugar, rice, wine (from France and Hungary), cloth, laces, coal, machines, the finer qualities of silk fabrics, jewelry, &c. The domestic commerce of the German states is by no means less important than the foreign, but no accurate statistical tables in regard to it can be obtained. The principal marts are Leipsic, Frankfort-on-the-Main, Frankfort-on-the-Oder, and Brunswick. The monetary centres are Frankfort-on-the-Main, Vienna, Berlin, Augsburg, and Hamburg. The silver standard prevails in Germany. The unit in the northern states is the *Thaler* (80 thalers to 1 Zollverein pound of silver, equal to 1.889 lb. avoirdupois); in the western the *Gulden Rheinisch* (52½ to 1 pound of silver); in Austria the *Gulden* (45 to 1 pound of silver). The gold coins common to all Germany are the crown (50 to 1 pound of fine gold), and the half crown. Their value is regulated by commerce, and averages about 9½ thalers (\$6.58) the crown. —In 1858 Germany had 6,752 m. of railroad, viz.: Prussia (including the non-German provinces) 2,640 m., Austria 1,173 m., Bavaria 759, Hanover 450, Saxony 850, Baden 240, Hesse-Cassel 205, Württemberg 177, Holstein 158, Mecklenburg-Schwerin 182, Hesse-Darmstadt 108, Brunswick 71, Anhalt 66, Saxe-Weimar and Nassau 44 each, Saxe-Coburg-Gotha 28, Saxe-Altenburg 20, and the remaining states less than 20 each. The capital invested in the roads (stocks and bonds, and appropriations of the different governments respectively) amounted to \$610,000,000. Their aggregate earnings in 1856 were \$56,700,000; and they carried in that year 41,500,000 passengers and 20,000,000 tons of freight. The number of locomotives in 1857 was 2,588, of which 1,978 were built in Germany, 308 in England, 177 in Belgium, 73 in the United States, and 22 in France. The length of macadamized turnpike road in Germany exceeds 85,000 m. Regular steamboat lines are established on the 6 principal rivers, the Rhine (since 1827), Danube (since 1833), Elbe, Weser, Main, and Moselle. Steamships ply regularly between the ports on the Baltic and North seas, and various British, Danish, Swedish, and Russian ports. There are two

transatlantic lines of steamers, the Hamburg line, with 5 ships, and the North German Lloyd at Bremen, with 4 ships. Trieste is connected by a numerous fleet of steamers with all Mediterranean ports.—The Christian religion is professed by all inhabitants of Germany, the Jews only excepted. Roman Catholicism is professed by 52½ per cent. of the total population, Protestantism by 46½ per cent. of the total, or 55 per cent. of the purely German population. The Roman Catholics are, in Austria, 97 per cent., in Bavaria 71, in Rhenish Prussia 70, in Baden 65, in Silesia 56½, in Westphalia 54, in all the German provinces of Prussia 85½, in Hesse and Württemberg over 80 per cent. of the population. The Protestants (divided into Lutherans and German Reformed church, or united under the name of Evangelical church) number in the German provinces of Prussia 8,370,000, or 63 per cent. (42 per cent. of the aggregate total of Protestants in all Germany); in Saxony near 2,000,000, or 97 per cent. of the population; in Hanover near 1,600,000, or 89 per cent. The Dutch Reformed church, Baptists, and other dissenting denominations, have about 20,000 professors, Moravians 9,000, German Catholics and Free congregations about 25,000.—Public education in Germany is more general than in any other country, with the exception of some of the states of the American Union. There are 24 universities (Berlin, Bonn, Breslau, Erlangen, Freiburg, Giessen, Göttingen, Grätz, Greifswalde, Halle, Heidelberg, Innspruck, Jena, Kiel, Königsberg, Leipsic, Marburg, Munich, Oimütz, Prague, Rostock, Tübingen, Vienna, Würzburg), beside a number of theological colleges, agricultural colleges (Eldena, Jena, and Tharand), academies of veterinary surgery, a mining academy (Freiberg), polytechnical institutes (Berlin, Munich, Dresden, Brunswick, &c.), altogether with 1,600 professors and lecturers and about 16,000 students (1 to 2,746 inhabitants). Of gymnasia (colleges) there are over 400. Normal schools, academies of commerce, technology, navigation, grammar schools, private academies, institutions for the blind and for deaf mutes, are numerous. As to common schools, they are more general than in any other country. In nearly all German states the attendance of all children at school for a term of at least 5 years is made compulsory by law; and in some states, especially in central Germany and in Württemberg, those who are unable to read and write are very rare exceptions indeed. In Prussia there are only 2½ per cent. of children between 7 and 15 years of age who do not attend school (in Bavaria 20, in Austria 28, in France 44 per cent.). Nearly all the capital cities have large public libraries, museums of art, scientific collections, &c. The royal library of Munich contains 800,000 volumes and 20,000 manuscripts, the royal library of Berlin 500,000 volumes, the imperial library of Vienna 850,000 volumes and 20,000 manuscripts, the royal library of Dresden 800,000 volumes and 2,800 manuscripts, and the university library of Göttingen 800,000 volumes and 5,000 manuscripts. Beside

these, there are at least 12 libraries containing each over 100,000 volumes. Anatomical and mineralogical museums, zoological and botanical gardens, observatories, &c., are connected with most of the universities. The number of associations of scholars in all different sciences is very great. The fine arts are as carefully fostered as science. Not even Italy is ahead of Germany in musical composition, many of the greatest composers of modern times being Germans, as Handel, Gluck, Mozart, Beethoven, Weber, Haydn, Meyerbeer, and Mendelssohn. In the art of painting the members of the two principal German schools, of Munich (Cornelius, Kaulbach), and of Düsseldorf (Schadow, Leasing), rival the best artists of all times. In sculpture Rauch, Dannecker, and Rietschel take rank with Thorwaldsen and Canova. German literature is exceedingly prolific, and contains a very great number of works of sterling merit. The periodical press of Germany stands, in regard to the number and intrinsic value of publications, below that of England, and perhaps of the United States. Still it has made considerable progress since 1848. The largest and most influential newspapers are the *Allgemeine Zeitung*, Augsburg; *Kölnische Zeitung*, Cologne; *Deutsche allgemeine Zeitung*, Leipzig; *Ostdeutsche Post* and *Wiener Zeitung*, Vienna; *Vossische, National-, and Volks-Zeitung*, Berlin; *Weser-Zeitung*, Bremen; *Hamburger Nachrichten*, Hamburg; *Zeitung für Norddeutschland*, Hanover; *Nürnberger Courier*, Nuremberg; *Der Schwäbische Mercur*, Stuttgart; *Frankfurter Journal* and *Oberpostamt's Zeitung*, &c.—Politically Germany is divided into 85 states, of which 81 have a monarchical and 4 a republican form of government. Two of the monarchies, Austria and Prussia, belong to the great powers of Europe, and possess large territories without the limit of Germany; while two of the German states are subject to non-German rulers (Holstein with Lauenburg to the king of Denmark, Luxemburg with Limburg to the king of Holland). The states of Germany are: 1 empire, Austria; 5 kingdoms, Prussia, Bavaria, Saxony, Hanover, and Würtemberg; 1 electorate, Hesse-Cassel; 7 grand duchies, Baden, Hesse-Darmstadt, Luxemburg (with Limburg), Mecklenburg-Schwerin, Mecklenburg-Strelitz, Saxe-Weimar, and Oldenburg; 8 duchies, Holstein (with Lauenburg), Brunswick, Nassau, Saxe-Meiningen, Saxe-Coburg-Gotha, Saxe-Altenburg, Anhalt-Dessein-Köthen, and Anhalt-Bernburg; 9 principalities, Schwarzburg-Sondershausen, Schwarzburg-Rudolstadt, Lippe-Deinold, Schaumburg-Lippe, Waldeck, Reuss senior, Reuss junior, Hesse-Homburg, and Liechtenstein; 4 free cities, Lübeck, Frankfurt, Bremen, and Hamburg. Of Austria, only the two archduchies of Austria proper, Styria, Salzburg, Carinthia, Carniola, the Littoral, Tyrol, and Vorarlberg, Bohemia, Moravia, and Silesia form part of Germany; of Prussia, only the Rhenish provinces, Westphalia, Hohenzollern, the provinces of Saxony, Brandenburg, Pomerania, and Silesia. (For a comparative table of area

and population, see EUROPE.) Germany is a loose confederation (*Bund*) of sovereign states, founded upon an act of the congress of Vienna, June 8, 1815, and a statute agreed upon, May 15, 1820. The original object of the confederation was simply the preservation of the territory of, and law and order in, the different states. Hence it has been argued that the confederation was of a purely defensive character, and could not in any case assume an aggressive position without endangering the European balance of power. But the 37th section of the supplementary statute of 1820 confers upon the Bund ability to wage war against a foreign power, not only when an invasion has actually taken place, but also when the frontier of Germany seems to be endangered. It was upon the ground of this clause that Austria claimed the assistance of the Bund in her war with France and Sardinia in 1859. The administration of the Bund rests with the diet (*Bundestag*, or *Bundesversammlung*), which consists of representatives appointed by the several governments without any concurrence of the people. The diet is a most awkward and unwieldy machine, since its members are bound in every vote to comply with distinct instructions from their governments. The chairmanship is vested in Austria. In all questions pertaining to the general organization of the Bund, the whole number of votes is 69, of which 4 are cast by Austria and each of the 5 kingdoms, 8 by Baden, Hesse-Cassel, Hesse-Darmstadt, Holstein, and Luxemburg, 2 by Brunswick, Mecklenburg-Schwerin, and Nassau, and 1 by each of the remaining states, including some which have been united with others since the foundation of the Bund. When going into executive committee, the diet has only 17 votes, of which 11 are cast by Austria, the 5 kingdoms, Baden, the two Hesses, Holstein, and Luxemburg; while of the remaining 6 votes each is cast by a number of the petty states collectively. The diet meets at Frankfurt, and is recognized as an independent power; but it has never yet sent ambassadors abroad to represent the German confederation, though several foreign ministers are accredited near it. During 40 years of its existence, the diet has confined its labors almost exclusively to the centralization of repressive measures against all popular movements. The most important feature of the confederation—its military organization—has never yet been tested by actual experience. The army of the confederation is to consist of the quota (*Contingente*) of the different members (1 per cent. of the population, beside  $\frac{1}{2}$  per cent. for the reserve), numbering altogether 470,000, not including the reserve forces; but this number is considerably exceeded. One-eighth of the total number is to consist of cavalry, and 2 guns are to be furnished with every 1,000 men. The fortresses belonging to the confederation, and to be garrisoned by the federal army, are Mentz, Luxemburg, Landau, Ulm, and Rastadt. The army is divided into 10 *corps d'armée* and 1 division of in-



fantry reserves. The first 8 corps are furnished by Austria (in 1855, 158,800), the 4th, 5th, and 6th by Prussia (170,500), the 7th by Bavaria (50,200), the 8th by Württemberg, Baden, and Hesse-Darmstadt (47,500), the 9th by Saxony, Hesse-Cassel, and Luxemburg (85,800), the 10th by Hanover, Brunswick, Holstein, the two Mecklenburgs, Oldenburg, and the three Hanse towns (49,900), and the division of infantry reserves by the remaining 16 petty states. The total number in 1855 was thus 525,000 (404,500 infantry, 71,150 cavalry, 40,200 artillery, 5,700 engineers, &c., 16,800 teamsters, &c.), with 1,122 pieces of ordnance. In 1856 the number had increased to 560,000. Yet even this is not one-half of the entire military force which Germany is able to wield. The armies of the different states are far greater than their quota to the army of the confederation. The army of Austria alone, including her non-German provinces, upon the war footing, exceeds 700,000 men, with 1,844 pieces of ordnance; and that of Prussia, including both classes of the *Landwehr*, 541,000 men, with 1,004 pieces of ordnance. Thus, Austria and Prussia united with all Germany would be able to muster nearly 1,500,000 soldiers. But if formidable, when united, on land, Germany is utterly powerless on the sea. It has no navy at all. In 1848 an attempt was made to establish one by voluntary contributions of the people, but it was one of the first acts of the diet, when resuscitated, to sell the small squadron at auction, in 1852, and to destroy all vestiges of its existence.—Of the earliest history of Germany no records remain. The Romans, before the time of Julius Cæsar, knew little or nothing of the people living E. of the Rhine and N. of the Danube, though some German tribes had invaded the Roman empire toward the end of the 2d century B. C. At the time of the conquest of Gaul (France), the Romans learned that the country beyond the Rhine contained a numerous people, who, although barbarians according to the standard of civilization of that time, had fixed settlements and were agriculturists. They were called Germani, either, as Strabo asserts, because they were nearly related—brothers german—to the inhabitants of Gallia, or, which is more probable, from the weapons they carried (*ger*, spear, *guerr*, war, *Heer*, host, or *Wehr*, arms). If the latter theory is correct, Germans would mean spear men or warriors. They were tall, light-haired, blue-eyed, warlike, and fond of independence, intoxicating liquors, and games, in which they often staked their personal liberty. Their chief occupations were hunting, care of cattle, and the use of arms. They were divided into nobles, freemen, and serfs. They paid peculiar respect to their women and the aged, and honored chastity not less than valor. They elected their chiefs, whom the Romans often call kings. They had priests, bards, and sacred groves, and worshipped or feared gods, demigods, and giants. Woden and his wife Fria or Frigg, Ziu, and Fro, were among their chief divinities. They be-

lieved in the immortality of the soul, or in life in Walhalla. Their sacrifices consisted of domestic animals, including horses, and sometimes of human victims. They had no cities, but mostly lived in hamlets, or small communities, which held several species of property in common. They were divided into more than 50 tribes, of which the following principally (though not simultaneously) figure in the history of the Romans: the Teutons, Ubii, Chauci, Catti or Chatti, Ruggi, Varni, Batavi, Usipetes, Tencteri, Bructeri, Angrivarii, Tribocci, Cherusci, Longobardi, Suevi, Goths, Marcomanni, Hermunduri, Burgundians, Narisci, Vandals, Gepidas, Franks, and Alemanni. These tribes did all live within the limits of the Germania proper of the Romans, which was bounded by the North sea and the Baltic, the Elbe, Danube, and Rhine. The districts S. of the Danube and W. of the Rhine, which became Roman provinces under the names of Rætia, Vindelicia, and Noricum, and Germania Prima and Secunda (in Gaul), were mostly inhabited by non-German tribes, and often exposed to the incursions of the Germans. One of these incursions was headed by Ariovist, who was driven from Gaul by Cæsar, in the first year of his Gallic campaigns. Cæsar and the generals of Augustus nominally subjected Germany; but when the Romans attempted to convert their nominal dominion into real possession of the country, they were ignominiously defeated, and Germany was liberated by the chief of the Cheruscan tribe, Arminius, or Hermann, A. D. 9. The subsequent expedition of Germanicus was of little avail. From that time the history of Germany is in part lost in vague traditions and in part connected with the history of the Roman empire for several centuries, until the country, over which the whole torrent of the great migration of nations had swept, became gradually united with the great Frankish empire of Clovis (481–511) and his successors. Among these Charlemagne, or Karl the Great (771–814), consolidated the empire by subjecting the Saxons, the last German tribes who had, until then, succeeded in maintaining their independence. Charlemagne's rule extended from the Ebro in Spain to the Elbe in the N. E., the Raab (Hungary) in the S. E., and beyond the Po in Italy. He compelled the Saxons to become Christians, but at the same time he introduced among them an institution any thing but beneficial or congenial to them, viz.: a feudal aristocracy and a strong temporal power of the clergy. The contest between these and the royal power fills the history of Germany for long centuries. The feeble successor of Charlemagne was unable to keep the vast empire together. In 843 it was divided between his 3 sons, Italy falling to the share of Lothaire, France to Charles the Bald, and Germany to Louis. The German kingdom was at that time bounded W. by the Rhine, E. by the Elbe, the Saale, and the Bohemian forest, and S. by the Danube. The sons of Louis subdivided Germany into 8 lesser kingdoms, but these were reunited by Charles, and for a brief

time even France was once more joined to Germany (882-887). Arnulf, a nephew of Charles, was elected German king, and was succeeded (899) by his son Louis, surnamed the Child, with whom the Carolingian dynasty became extinct (911). Germany at that time consisted of a number of great territories (duchies), the rulers of which, together with their most powerful vassals, elected the king, whose power, however, depended very much upon the good will of the dukes. The Franconian, Conrad I. (911-918), unsuccessfully endeavored to make his authority respected by the mighty Saxon duke Henry, and on his deathbed entreated his subjects to elect his own adversary. Henry I. (919-936) restored the empire by victories over the Danes, Slavi, and Magyars. His son, Otho I. (936-973), extended the boundaries beyond the Elbe and Saale rivers, defeated the Magyars, who had invaded the country, so completely that they never afterward ventured to return (955), and conquered Lombardy. From that time the conquest of Italy became one of the principal aims of nearly all rulers of Germany. For many of them the barren honor of being crowned by the pope emperor of the Roman empire became the chief object of all their desires, to obtain which they allowed their royal power in Germany to be encroached upon more and more by the vassal princes. The Saxon dynasty ruled until 1024 (Otho II. 973-983, Otho III. 983-1002, Henry II. 1002-24), and was succeeded by the Franconian. Conrad II. (1024-'39), an energetic and well-meaning man, conquered Burgundy for the German empire. His son, Henry III. (1039-'56), extended the German influence over the Slavic countries and Hungary, and succeeded for a time in maintaining the royal authority against all attacks of the aristocracy and hierarchy. But the youthful Henry IV., who acceded to the throne in 1056, was unable to resist the power of the papacy, then at its zenith under Gregory VII., and was obliged to yield some of the most important prerogatives of the crown. His son, Henry V. (1106-'25), was the last ruler of the Franconian dynasty. After the brief reign of Lothaire II., the dynasty of the Hohenstauffen (Swabians) succeeded to the throne, and gave to the country 5 kings: Conrad III. (1138-'52), Frederic I. (1152-'90), Henry VI. (1190-'97), Frederic II. (1215-'50), and Conrad IV. (1250-'34). Between Henry VI. and Frederic II., Philip of Swabia and Otho IV. of Brunswick reigned as rival kings, and after the death of Philip Otho alone. The two first of the Hohenstauffen represent the most glorious period of German history during the middle ages. Frederic I., surnamed Barbarossa (*der Rothbart*), figures in the popular songs and traditions of Germany as the ideal emperor, the representative of German national power and splendor, who, according to the popular legend, is not dead yet, but only asleep in a cave under the Kyffhäuser mountain, whence he will arise once more in all his might, to restore the empire in its former glory. The conquest of Italy and the attempt to break the tem-

poral power of the pope were the great objects of the Hohenstauffen emperors. After a gigantic struggle, lasting nearly a century, they succumbed. From 1250 to 1273 anarchy prevailed in Germany. Several rival kings were elected (William of Holland, Richard of Cornwall, Alfonso of Castile, and Henry Raspe), but none of them obtained any authority. At last, in 1273, Count Rudolph of Hapsburg was elected king, and, by vigorously suppressing the feuds of the knights and barons, succeeded in reestablishing at least the semblance of royal authority. At the same time he was successful in obtaining for his family several important territories (Austria, Styria, Carinthia, Carniola, and Tyrol). After his decease (1291) Adolph, count of Nassau, was elected king by the dukes, who were jealous of the growing power of the Hapsburgs; but Albert, Rudolph's son, wrested the crown from him (1298-1808). Under Albert's reign the Swiss cantons declared their independence of Austria. His successors were Henry VII. of Luxemburg (1308-'13), Louis IV. of Bavaria (1313-'47), Charles IV. of Luxemburg (1347-'78), who by a sort of written constitution (golden bull) defined and increased the power of the prince electors, Wenceslas or Wenzel (1378-1400), so miserable a ruler that it was found necessary to dismiss him, Rupert of the Palatinate (1400-'10), and Sigismund, brother of Wenceslas. During the reign of the latter the attempt of Huss to reform the doctrines of the church was the principal event. Huss was burned at the stake, at the council of Constance (1415), the emperor having ignominiously broken his pledge to protect him during his stay at Constance. This treachery provoked the bloody war of the Hussites. After Sigismund's decease (1437), the royal or imperial crown of Germany (the title of Roman emperor having gradually supplanted that of German king) remained continuously with the Hapsburg family. The energetic and liberal Albert II. (1438-'40) was succeeded by the inert and feeble Frederic III. (or IV., as Frederic the Fair, the rival of Louis the Bavarian, had borne the title of king, as Frederic III.), who bore the royal title for more than half a century (1440-'93). His son, Maximilian I. (1493-1519), a chivalrous man of noble impulses, but lacking perseverance, organized the empire more systematically than had ever before been attempted, but was unsuccessful in his efforts to establish a national army. Under his reign the reformation of the church was begun by Luther (1517). Once more Germany became the ruling power of Europe under Charles V., grandson of Maximilian, who united the crowns of Spain, the Netherlands, Germany, and Naples, and vigorously opposed the efforts of France to obtain the control of Italy. But even during his reign the germs of civil and political dissension contained in the reformation of the church began to be developed in Germany. A formidable insurrection of the peasants, who longed for civil as well as religious liberty, was quelled with difficulty by the princes under the

sanction of Luther, who was only too anxious to scout the idea of an amelioration of the political condition of the people. The Protestant princes of northern Germany leagued themselves against the imperial authority, and though Charles defeated them (1547) by the aid of Maurice of Saxony, he was compelled by his former ally to grant important privileges to the Lutheran church (1552). In the mean time the 8 bishoprics of Toul, Metz, and Verdun had been wrested from the German empire by France. Disgusted with the successes of his adversaries, Charles resigned the crown. He was succeeded by his brother Ferdinand I. (1558-'64). The imperial authority was rapidly sinking to utter insignificance. France in the west and Turkey in the east were hovering on the borders of Germany, ready on every occasion to foster the internal dissensions of the empire and to conquer from it valuable possessions. The feeble Maximilian II. (1564-'76), the visionary Rudolph II. (1576-1612), and his brother Matthias (1612-'19), were unable to stem the political decay. The 30 years' war (1618-'48), which devastated and impoverished Germany, destroying all industry and commerce, left the imperial authority completely shattered, and Germany cut up into a multitude of petty states, the rulers of which were absolute monarchs in fact, if not in name. The horrors perpetrated by the monarch Ferdinand II. (1619-'37) against his Protestant subjects were unparalleled since the days of Genghis Khan. The peace of Westphalia (1648) concluded by Ferdinand III. (1637-'57) tore Alsace from the German empire. Under the pedantic and feeble-minded Leopold I. (1658-1705) Germany took part in the coalition against the rising power of France, but, although successful in war, did not obtain any signal advantages by the peace. From that time the title of German emperor appeared only as an empty surname of the rulers of Austria (Joseph I., Charles VI., Francis I., the husband of Maria Theresa, whose enemy, Charles Albert of Bavaria, was also crowned as Charles VII., &c.). In fact, Germany was merely a maze of almost numberless little despotisms, among which a few larger states were endeavoring to obtain a voice in the councils of Europe. Prussia was successful, through the genius of Frederic the Great, in establishing a great Protestant power, able to cope with Austria, but at the same time anxious to prevent the reconstruction of a great united empire. Thus the attempts of the emperor Joseph II. (1765-'90, or rather 1780-'90, when he reigned himself) to reestablish the imperial authority in southern Germany were baffled by Prussia. At last the tempest of the French revolution prostrated the tottering ruin of the German empire. Vanquished by the armies of France, the emperor Francis II., son and successor of Leopold II. (1790-'92), ceded by the treaties of Campo Formio (1797) and of Luneville (1801) the country on the left bank of the Rhine. The petty rulers who lost their possessions in this way were indemnified

by the territories of ecclesiastical princes. In 1805 several states seceded from the empire and became allies of France; and when at last, in 1806, a number of German states formed the Rhenish confederation under the protectorate of Napoleon, the emperor Francis resigned the German crown, and the empire was formally dissolved. A number of the smaller territories were annexed to the larger states, and most of the free cities, which, under the nominal authority of the emperors, had enjoyed a sort of republican government, lost their independence. The efforts of Prussia to oppose to this confederation a north-German league having been frustrated, nearly the whole of Germany, with the exception of Austria and Prussia, was reduced to a state of French vassalage. The minions of the emperor Napoleon ruled the country with an iron rod, and if they removed many of the most glaring remnants of feudal despotism, they introduced in their stead all the horrors of an irresponsible military régime, and carried their extortions to a frightful extent. The sums drawn from Germany by Napoleon under the designation of contributions or subsidies must be counted by hundreds of millions. The independence of the country was reestablished by the coalition of Austria, Russia, Prussia, Sweden, and Great Britain (1812-'15). A reconstruction of the old empire having been rendered impossible by the position which Prussia had assumed, a confederation was formed by all those states which had contrived to maintain their sovereignty during the Napoleonic troubles (June 8, 1815). Their number, which had exceeded 300 at the time of the dissolution of the empire, had then been reduced to less than 40, and a further reduction has since then taken place by the extinction of several petty dynasties. The enthusiastic hope of the German people that Germany would once more appear as a powerful united nation was sorely disappointed. No national representation was to give stability, upon a popular basis, to the confederation. The diet being only a permanent convention of the representatives of princes, all jealous of their individual sovereignty and unwilling to recognize the claims of the nation, became an abject tool of political oppression, and a harmonious coöperation of the states existed only in regard to repressive measures against all progressive movements. Wherever the people of a single state endeavored to obtain free institutions, the diet found occasion to interfere in favor of absolute monarchical power. None of the promises contained in the act of confederation in regard to a general tariff legislation, a common currency and postal system, &c., were fulfilled. Whatever was attained in this respect was due to the efforts of single states. Thus the Prussian Zollverein united a large portion of the German states on the basis of common material interests, and, by the great advantages it secured to its members, kept alive the longings for a still more complete national union. The French revolution of 1830

found an echo in some of the smaller German states, the rulers of which were compelled to grant written constitutions to their subjects. A vigorous political life began to be developed in the S. W. states, and after the accession to the Prussian throne of Frederic William IV. (1840), in northern Germany also the demands of the people became more distinctly defined, while in Austria all popular aspirations were suppressed by the despotic rule of Prince Metternich. Immediately upon the downfall of the Orleans dynasty in France (Feb. 24, 1848), insurrections, more or less bloody, broke out in all the German states. The princes, unable to resist these movements, hastened to yield to the popular demands. A national congress of representatives of the people (German parliament) was convoked by a provisional self-constituted assembly (*Vorparlament*), and met at Frankfort-on-the-Main, May 18, 1848. It formed a provisional national government, consisting of a vicar of the empire (*Reichsverweser*) and a ministry. Archduke John of Austria was elected vicar, June 29, but in spite of all his professions of zeal for national liberty and union, it soon became evident that his sole aim was the frustration of all energetic action on the part of the parliament. Distracted by the troubles in Holstein, which Denmark endeavored to wrest entirely from its connection with the German confederation, the parliament made but slow progress in the framing of a national constitution. When at last the bill of rights had been agreed upon (Dec. 1848), the counter-revolution had already been victorious in Austria and Prussia, and it became apparent that these great powers would not submit to a constitution framed by the popular congress. Then a strong party began to advocate the exclusion of Austria from the new empire. This party, whose principal leader was Gagern, prevailed in the parliament, and elected the king of Prussia German emperor, or rather emperor of "Little Germany," as it was called derisively by those who scouted the idea of a German empire not including Austria (March 20, 1849). The king of Prussia declined the proffered honor. Despairing of success, a number of members of parliament resigned their position, thus giving a majority to the democratic party, who proceeded to elect a provisional regency of the empire, consisting of Raveaux, Vogt, Schüler, H. Simon, and Becher. Reduced to less than one-third of its original number, the parliament adjourned to Stuttgart, May 30, 1849, and endeavored to raise a popular revolution in favor of the new national constitution. But only the people of Baden, a small part of Württemberg, and the Palatinate (Bavaria) followed the example of Saxony, which had already risen in revolution. The insurrection at Dresden was suppressed after a sanguinary battle by Prussian soldiery; and the revolution in Baden, although successful for a few weeks, was likewise crushed in a brief campaign by the Prussian army (June). The rump parliament at Stuttgart had, in the mean time, been forcibly dissolved by the gov-

ernment of Württemberg. Having thus got rid of all revolutionary support, the Prussian government attempted to obtain the mastership of Germany on its own account. Austria, almost prostrated at the time by the Hungarian war, would have been able to offer little or no resistance to such a movement if carried on energetically and rapidly; but the weak and imbecile Prussian government was no match for the bold and shrewd Prince Schwarzenberg, at that time the soul of the Austrian government. In April, 1850, Prussia convoked at Erfurt a new parliament of representatives of those petty states which were too powerless to resist its demands, and a sort of federal constitution was adopted by it, but never obtained any real existence. In order to cut short all further attempts of Prussia, Austria convoked the old diet, which had been formally dissolved in 1848. Prussia refusing to recognize the diet, a hostile conflict between Austria and Prussia seemed almost inevitable. The armies of both were marching to Hesse-Cassel, and a skirmish of the outposts had already taken place near Bronzell (Nov. 8, 1850), when suddenly the Prussian government lost courage and submitted to all the demands of Austria. The first fruits of the restoration of the diet were the intervention in Schleswig-Holstein in favor of Denmark, the abolition of the national bill of rights and of free constitutions in several of the smaller states, the sale by auction of the national navy which had been created by voluntary contributions of the people during the revolution, &c. While in these questions the influence of Austria prevailed, Prussia balanced its loss of political power by the enlargement of its commercial influence. Hanover became a member of the Zollverein (Sept. 7, 1851), and was soon followed by Oldenburg and Schaumburg-Lippe. The efforts of Austria to enter the Zollverein, in order to destroy the Prussian influence even there, were successfully resisted by Prussia, but a postal and telegraph union of all German states was accomplished. During the oriental war (1854-'56) the German confederation followed a vacillating policy, swaying to and fro between Austria and Prussia. On April 24, 1854, Austria and Prussia concluded a treaty of alliance, guaranteeing to each other their possessions against all enemies whatever. The diet joined in this treaty July 24, and added another clause, promising the assistance of all Germany to Austria if its army of occupation in the Danubian principalities should be attacked (Dec. 9). Preparation for war was resolved upon by the diet, Feb. 8, 1855. After that the position of Prussia toward Austria became more reserved, and Austria, despairing of an active assistance on the part of the confederation, was compelled to relinquish its intention to take part in the war against Russia. The peace of Paris was accepted by the diet, May 15, 1856. On Nov. 6, 1856, the diet adopted a resolution promising to assist Prussia in its attempts to reconquer Neufchâtel, but the proffered assistance

was not required. In 1857 the interference of the diet was requested against Denmark's attempts to merge the duchies of Holstein and Lauenburg completely into the Danish kingdom. After long hesitation and delay, a resolution was at last adopted in 1858, by which the Danish government was compelled to submit its project of a new political organization to the legislative assemblies of the duchies. A currency convention was concluded between all the German states, Jan. 24, 1858, and went into effect Jan. 1, 1859. When, in the beginning of 1859, difficulties arose between France and Austria on account of the state of Italy, a violent anti-Napoleonic feeling manifested itself in Germany. A large portion of the press was ready to maintain that the preservation of a German power in S. E. Europe, and the prevention of a combined Russo-French preponderance on the continent, were more essential to the eventual interests of liberty than the annexation of the Italian provinces of Austria to Sardinia. The Prussian government, though willing to defend Austria's German provinces, and even the Venetian kingdom, under certain restrictions, would not stir unless it should obtain the military leadership of all Germany, irrespective of all limitations contained in the act of confederation. After long and angry discussions the leadership was conceded to Prussia by the smaller states, though with a very bad grace, and resolutions originating with Hanover, to the effect that the federal army should be mobilized—thereby forcing Prussia to submit to the directions of the diet—were withdrawn in order to enable Prussia to assume a leading and controlling position. A circular despatch of the Russian government, covertly threatening Germany if it should interfere in the Italian war, had no other effect but the assumption by Prussia of a more defiant attitude toward France, and the issue of an order by the prince regent to mobilize two-thirds of the Prussian army (June 14, 1859). On June 25 the Prussian delegate in the diet moved that two federal army corps under the command of Bavaria be stationed on the upper Rhine, one Prussian corps on the Main, and that the 9th and 10th federal army corps be united with the Prussian army. This motion was followed by another (July 4), to the effect that the diet should appoint a commander-in-chief of the non-Prussian and non-Austrian army corps. Thus the German confederation appeared to be on the very point of waging war against France, under Prussian leadership, when all at once Austria, unwilling to sacrifice its preponderating influence in Germany to the doubtful project of preserving its Italian provinces, introduced in the diet (July 7) a resolution to mobilize the whole federal army, and to appoint the Prussian prince regent commander-in-chief, subject however to the control of the diet, or rather of Austria, the latter being always certain of a majority in the diet. This movement at once neutralized all advantages Prussia had obtained, and when the prelimina-

ries of peace were agreed upon by the emperors of France and Austria, July 11, the dissension and jealousy between Austria and Prussia, those great impediments of German unity, were more apparent than ever before. A passage in the Austrian emperor's proclamation of peace, in which he asserted that his natural allies had forsaken him, and that the neutral powers would have imposed upon him less favorable terms of peace than were offered to him by his adversary, gave rise to an acrimonious correspondence between the Austrian and Prussian governments. The latter succeeded in proving that the assertion of the emperor had no foundation in fact, and that he had been purposely misled by false representations of the French ruler at the interview of Villafranca. However, this singular discovery did not render the feeling of Austria any more friendly toward Prussia. A paper war was carried on by the presses of southern and northern Germany, and while the governments of those petty states who had been the most forward in their hostile demonstrations against France were eagerly courting the favor of Napoleon III., the most sinister threats against Prussia came from Vienna, Munich, and Karlsruhe. The opinion became prevalent that, Austria having been humbled by France, if a war for the conquest of the left bank of the Rhine should be waged by France against Prussia, the latter would not obtain any assistance either from Austria or the smaller German states. The hostilities of the two great sections of Germany manifested itself in sanguinary riots in the mixed Prussian and Austrian garrison of the federal capital (Aug. 6-8). Feeble movements were initiated by the liberal party to stem the progress of disunion, and to prompt the Prussian government to take the lead in reforming the federal constitution. But Prussia, disheartened and unwilling openly to oppose the influence of Austria, declined the destiny which the liberal party pressed upon it, and would promise nothing more than the promotion of liberal institutions by the power of its example. Austria, on the other hand, made some show of concessions to the popular wishes, in order to divide the current of the sympathies of the popular party in Germany. A committee was appointed by the emperor (Aug. 1859) to draw up a constitution upon the basis of provincial representation for the Austrian empire. At the same time another movement was initiated in Bavaria, the object of which was the creation of a separate confederation of the central German states, as a third great power within Germany. The same idea had been promoted by Bavaria in 1850, and then led to confusion and disunion.

GERMANY, LANGUAGE AND LITERATURE OF. The Teutonic (*Teutsche* or *Deutsche Sprache*), in the widest acceptation of the term, is one of the 6 families of the Indo-European stock of languages. It consists of two branches, viz.: the northern or Scandinavian (see DENMARK, SWEDEN, and ICELAND, LANGUAGES OF), and the

southern or German of the continent. The latter has 8 subdivisions, viz.: the eastern or Gothic, with its kindred idioms; the high German of 3 periods of time, old, middle, and new; and the low German, which also comprehends the Frisian, old Saxon, Anglo-Saxon, Dutch, and Flemish. In a still stricter sense, the 3 last mentioned languages are excluded from the German proper, which is now chiefly represented by the high German literary idiom. The terms language or tongue, and dialect or idiom, cannot in our restricted space be precisely distinguished from each other, owing to the vagueness of the limit that separates them; nor can we give a complete account of all ancient idioms of the Heruli, Gepidae, and other ancient portions of the German people. We shall treat of the boundaries of the principal dialects, of the chief characteristics and of the grammatical and lexicographical literature of the German language in succession; taking the modern high German as the basis of comparison.—The boundaries within which the German language, in all its dialects, is spoken, are as follows: the S. boundary of the Flemish tongue (see FLEMISH LANGUAGE); the W. boundary of Prussian Rhineland; a line through Luxemburg and Lorraine, crossing the Moselle above Thionville; the ridge of the Voeges as far as Thann; thence a line to Laupen in the canton of Bern, along Lake Biemne, touching the N. extremities of the lakes of Neuchâtel and Morat; through the canton Freyburg, along the Saane, to the Alps; S. along these through the Valais to Leuk on the Rhone; from Leuk S. E. a short distance into Piedmont, passing W. of Monte Rosa; thence following the ridge of the Alps N. E. over the St. Gothard pass to the junction of the cantons Glarus, St. Gall, and the Grisons; E. to the Albula, N. E. to the Engadine, and across the Inn into the Tyrol; thence S. E. to the Adige, south of Salure; considerably E. of Bozen, Brixen, and Bruckeck; along the ridge of the Carnic Alps, separating Venice from Illyria, as far as Pontafel in Illyria; across the Gail valley toward Villach on the Drave; thence to the confluence of the Lavant with the Drave; E. through Styria over the Mur into Hungary. The boundary between the German and Magyar and Slavic regions is very ill defined; the greatest portion of the counties of Oedenburg, Wieselburg, one third of Eisenburg, some towns of Presburg, and many parts of other counties, being inhabited by Germans. Northward from Presburg the line follows the Danube and the March, thence by a line passing near Brünn and Znaim to Bohemia. The Cechs, to the amount of about  $\frac{1}{2}$ , occupy mostly the plains of Bohemia; while Germans hold the rest, being most numerous in the cities. Silesia is also divided between the German and Slavic elements. Prussian Silesia is mostly German. The German portions of Galicia contain about 170,000 inhabitants. The Slavi are found in Brandenburg within German territory on the Spree and Oder; also in Saxony, in Altenburg, &c. This

is owing to the ancient occupation of the eastern portion of Germany by Slavic tribes. The same is the case with Pomerania, both Mecklenburg, and both Prussias, which were conquered by Germans from the Slavi, especially from Poles and the ancient Prutzi. Posen is divided into a Polish and a German portion. The German element has made and is continually making inroads upon the Slavic. Tilsit and Memel are German towns in Lettic territory. The nobility and the people of several cities of the Russian Baltic provinces also speak German. The shores of the Baltic from the Curische-Haff to the Eider (with the exception of 5,000 Kassubes in Pomerania) are the northern boundary of the German tongue. Two broad strips on the shores of Schleswig (the eastern beyond Flensborg, the western almost as far as Tondern), and a portion of the interior, comprising in all about  $\frac{1}{3}$  of the duchy, are peopled by Germans. The shores of the North sea and the English channel as far as Gravelines complete the boundaries of the German language, taken in its widest signification. But outside of these limits there are detached portions of territory, as in Belgium, around the Splügen, near Vicenza, and in the diocese of Padua, where German is the language of the people. The whole number of Germans or Teutons in Europe amounts to about 51,000,000; of these there are 48,000,000 within the German confederation, and the rest in Holland, Belgium, Switzerland, France, Hungary, Transylvania, Schleswig, Galicia, Posen, and Italy. Many Germans are also found in all countries of the earth, especially in the United States of America.—The principal dialects of the German proper are as follows: I. Upper German, in two sections: 1. Southern German, south of a line from Strasbourg to the Bohemian forest; subdivided into: a. Alemannic, spoken on the upper Rhine, in Switzerland, where almost every canton has its own idiom, in Alsace, in the upper Black forest, with many varieties; the Sylvian, near Monte Rosa in Piedmont; the idioms in the Breisgau, Vorarlberg, &c. Specimens of words are: *Zit, Hús, khlug, Khranz, Milach, Liacht, sáje*, &c., for the modern high German *Zeit, Haus, klug, Krans, Milch, Licht, etc.* b. Swabian (*Schwäbisch*), less ancient, spoken in the greater part of Württemberg, between the Black forest and the river Lech, as far south as the lake of Constance; with varieties on the upper Danube, in the landgraviate of Baar, about Memmingen, on the Neckar, and about Ulm and Augsburg. Specimens: *Neabel, Weag, Schweschter, Bruschtkaschte, ligge, oba, W., Wuscht*, &c., for *Nebel, Weg, Schwester, Brust-Kasten, liegen, oben, Wirth, Wurst.* c. Bavarian (*Bairisch*), spoken chiefly in Bavaria, where are heard the old idiom and the idioms of Munich, Hohenschwangau, Hochland, and Saltzburg; in the Tyrol, including the idioms of the Zillerthal, Innthal, and Lientz; in the Italian *communi* in Austria, where, beside the Gottschee idiom, there are 6 varieties in Styria, 4 in Moravia, 4 in Lower Austria, others in Upper Austria, in

Carinthia, in Carniola, Bohemia, upper Silesia, the Zips and other parts of Hungary, and in Transylvania. Specimens: *lobm, geschlogen, gwe'n, haß, heisse, &c.*; Austrian, *hämlich*; Zipsish, *Ich bin noch bu mai söta es, &c.*; for *leben, geschlagen, gewesen, heiss, heisser, heimlich, Ich weiss nicht wo mein Vater ist*. The remnant of the Gothic dual *iggis* (to you two, old high German *inck*, old Saxon *inc*, old Norse *ycker*) occurs in Austria in 8 cases (nominative *enk, es*, or *tes*; genitive *enker*; accusative *enk, enkes*).

2. Middle German, south of a line drawn through Aix la Chapelle, Cassel, Nordhausen, Wittenberg, Orosen, and Meseritz; with very many varieties. *a.* In its western region is the Franconian dialect, which extends to the Rennsteig of the Thuringian forest, and from the Odenwald to the Fichtelgebirge and Bohemian forest, and has two sections, viz., one in the west, in the Odenwald and the Spessart, on the lower Main, in the Palatinata, with other varieties about Treves, Cologne, in Hesse, &c.; and the other section in the east, with varieties about Nuremberg, on the upper Saale, upper Main, in the Voigtland, in the N. W. of Bohemia, &c. Specimens: *Hersch, Fersch, Dorscht, wärsch, W. lib, gout* (E. *lib, gut*), &c., for *Hirsch* (stag), *Fürst, Durst, wäre es, lieb, gut*. *b.* In the eastern region, the upper Saxon has 8 subdivisions, viz.: the Thuringian, south of the forest ridge as far as the offshoots of the Hartz, and from the middle Werra to the Saale, with several varieties; the Misnian (*Meissner*), which is the softest of all, and the basis of the modern literary high German (*Neuhochdeutsch*), with its collaterals in the Osterland, Voigtland, Erzgebirge, Lusatia, &c.; and the Silesian, spoken also with variations in Moravia, in the Sudetic mountains, in Poland, &c. There are also several idioms in the Prussian and Russian provinces running along the Baltic shore east of Brandenburg. *II.* Lower German, in the belt north of the preceding, mostly in the country districts; high German being spoken in the cities. It has 8 groups: 1. Low Saxon (*Plattdeutsch*), with varieties in Hamburg, Holstein, Schleswig, Hanover, the Longobardo-Kymric, &c. 2. Eastern low Saxon, with idioms in Mecklenburg, on Rügen, in Pomerania, East Prussia, and Brandenburg. Specimen of the last: *Yeben Sie mich ene yut gebratene Yans, for Geben Sie mir eine gut gebratene Gans*. 3. Westphalian, west of the Weser, almost to the Rhine, with sub-dialects in Bremen, Osnabrück, Münster, Paderborn, &c. Specimens: *Bauk, Faut, Deif, Mensch, &c.*, for *Buch, Fuss, Dieb, Mensch*. The Saxon Westphalian is spoken in the Polish provinces of Prussia beyond Thorn. A more important mixture is that of the dialect of the lower Rhine with upper German sounds, as between Jülich, Cologne, Elberfeld, and Wesel, &c.—We know but few names of persons and places in Teutonic before the 4th century of our era; for instance, Segimerus, Inguiomerus, Actumerus, of the Cherusi, mentioned by Tacitus, and Chrodormarius, Vadomarius, Hariobandus,

&c., occurring among the Alemanni, much later. Now, *mors* in Gothic, and *mari, märe* in old high German, signify celebrated, and *hazig* (*hazri*), now *Heer*, signifies army; hence those names refer to the celebrity of their bearers on account of victories and other great deeds. Gothic is the first dialect known through the version of the Bible by Ulfilas (about 380). A few proper nouns and glosses remain to us of the Burgundian. Old high German is known by monuments of the 7th century, when it was split into 8 groups, viz.: upper German among the Alemanni, Bavarians, and Longobards; low German among the Frisians, Saxons, and Westphalians; and a middle group in Hesse, Thuringia, and Franconia. The eastern part of Germany was at that time in the possession of Slavic tribes. The Franconian dialect prevailed during Charlemagne's reign, and for some time after; the Longobardic early ceased to be spoken. The Frisians had already rendered their tongue literary, and Anglo-Saxon had been introduced into England about the middle of the 5th century. In consequence of their independence of the German empire, the Flemings and Hollanders developed their dialects into literary languages. The literary monuments of all the dialects belong more properly to the history of German literature; we may only mention that the middle high German became literary in the 12th century; that its poetry gave it predominance as far as Austria, and that it was surpassed during the 18th century by the Swabian, which obtained a still wider field. The other dialects strove to rival these two; but all the writings of the 14th and 15th centuries show the influence of the Swabian. The low German *Sachsenspiegel* and other law books were translated into upper Saxon, which at last became the dominant language, in consequence of the translation of the Bible by Martin Luther, and other circumstances which favored the development of the Misnian dialect into the modern literary high German. This and other dialects were much corrupted by admixtures from foreign languages, especially during the 80 years' war, which deluged Germany with hosts of strangers. Neither the influence of Opitz and his school, nor the efforts of several societies for the purification of the language, could withstand these inroads upon it. But Thomasius, toward the close of the 17th century, raised the fortunes of the language by making it the medium of scientific pursuits. Gottsched (1700–1786) reduced it to fixed rules, and the Swiss school, Haller, Hagedorn, Klopstock, &c., continued to perfect it. Lessing, J. H. Voss, Wieland, Herder, Schiller, Goethe, and others in poetry, Winckelmann, Kant, and Oken, in criticism and philosophy, brought it to its present eminence. Klopstock and others asserted that high German was a primitive language, and *sui generis*; but Wachler and others have shown its connection with the so called classic and other tongues. C. Frank, Dorn, Von Hammer, &c., proved it to be cognate with



Sanscrit, Greek, Persian, &c. Adelung, Mor-  
 &c., went so far as to say that these langua-  
 ges were but developments of the German, which  
 the Teutons had left in the course of their mi-  
 grations. Bopp, Eichhoff, &c., demonstrated  
 the close affinity with the above-mentioned lan-  
 guages, and with the Zend, Huzvareh, Latin,  
 Greek, and Lithuanian, both as regards the words  
 and their grammatical forms. Prichard, Dief-  
 bach, &c., demonstrated its relationship with  
 Celtic. Confining ourselves to its comparison  
 with Latin, by a union with which it produced  
 the modern Romanic languages (see *FRANCOIS*,  
*ROMANESQUE* or) and the English, we find that the  
 material of which both consists is essentially  
 identical, and that the grammatical forms of the  
 German are but relics of the Latin pronominal  
 suffixes. Thus: *oc-ulus*—*Aug-e*; *aur-is*—*Ohr*;  
*nas-us*—*Nase-e*; *gen-u*—*Kinn* (but misplaced);  
*cap-ut*—*Kopf* (*Haupt*, *Kapp-e*); *crin-is* and  
*corn-u*—*Harr* and *Horn*; *cut-is*—*Haut*; *ung-uis*  
*umb-il-icus*—*Nag-el*, *Nab-el* (transposing *n*  
 and *g*, and altering *m* to *n*); *arm-us*—*Arm*; *pes*  
*Fuss*; *man-us* and *compre-hend-ere*—*nehm-  
 en* (transposing *m* and *n*) and *Hand*; *pater*,  
*mater*, *frater*, *socer*—*Vater*, *Mutter*, *Bruder*,  
*Schwager*; *as* and *jug-um* (*yug-um*)—*Och-s* and  
*Joch* (both words from the connecting *c* with *i*  
 prefixed in the latter); *cib-us* and *cev-a*—*kau-en*  
 and *Kuh* (Eng. *chev*, *cud*=*chewed*, *cow*); *su-s*  
 (*swin-us*)—*Schwein*; *hœd-us*—*Geis* (Eng. *goat*,  
*hid*); *vol-ucr-is* (*volu acris*)—*Vogel* (Eng. *fowl*,  
*flock*); *pisc-is*—*Fisch*; *aqu-a*—*Au* and *Gau*;  
*ter-ra* and *arid-us*, *tor-reo*—*Erd-e* and *dürr*,  
*tro-cknen*; *gra-men* and *gra-ndis*, *cre-sco*, *gru-  
 o*—*Gras*, *gro-ss*, *Kraut*; *sol-ium*—*Blat-t*; *vent-  
 us*—*Wind*; *sol*—*Son-ne*; *stel-la* and *astr-um*—  
*Stern*; *di-es*—*Ta-g*; *nox*, *noct-is*—*Nacht*; *hes-  
 tern-us*—*gestern*; *eg-o*, *tu*, *is* (*id*)—*ich*, *du*, *es*;  
*ua-us*, *du-o*, *tri-a*, *qu-a(t)uor*, *quin(q)u-e*, *sex*,  
*sept(em)*, *oct-o*, *nov-em* (*non-us*), *dec(em)*, *cent-um*  
*ein*, *zwei* (*zwo*), *drei*, *vier*, *fünf*, *sechs*, *sieben*,  
*acht*, *neun*, *zehn*, *hundert*; *sta-re*, *ce-se*, *ed-ere*  
*(a-um)*, *sed-ere* and *sit-us*—*ste-hen*, *se-en*, *es-sen*,  
*sitz-en*, *setz-en*; and innumerable other common  
 sound-tokens of indispensable and primitive ob-  
 jects and ideas. The following are a few spec-  
 imens of compounds: *o-blig(a)t-io*—*Pflicht*; *in-  
 vent-um*—*find-en*; *calen-a* (*con-tinens*)—*Kette*;  
*con-duc*(*e*)*t-ere*—*Neis* (Eng. *net*, *k-nit*, *k-not*);  
*dis-parg-ere* (*dis-perg-ere*)—*Sprach-e* (*sp[r]eech*,  
 a spreading out of what we think); and in-  
 numerable other groups of concrete roots.  
 (See the single letters from D to Z).—On the  
 whole, the Teutonic dialects (or languages) are  
 characterized by 5 peculiarities: 1. The weak-  
 ening of pure into impure sounds, thus of *a* into  
*ä* or *e*, as in Anglo-Saxon and English, where the  
 former sound was very often changed into the  
 latter. 2. The breaking of *i*, *u* before *r*, *h*;  
 thus, Goth *airpan*, old high German *werfan*,  
 old Norse *verpa*, Anglo-Saxon *veorfan* (to warp,  
 to throw, wharf). This corresponds with the  
 Sanscrit *Guna*. 3. Metaphony (*Umlaut*), on ac-  
 count of succeeding formative syllables, espe-  
 cially in Anglo-Saxon, Norse, and high Ger-

man; thus, *hart*, *härter*; *Ort*, *Oärter*; *wurde*,  
*würde*. This is confined to the softening of *a*,  
*o*, and *u*. 4. Apophony (*Ab laut*), not on ac-  
 count of accessory syllables, and affecting *e*, *ei*,  
*i*, *ie*, and also *a*; thus, *galten*, *galt*, *gegolten*;  
*sprechen*, *sprich*, *sprach*; *reiten*, *ritt*; *sitz-en*,  
*sass*, *gesessen*; *schieben*, *schob*; *fallen*, *fiel*, &c.  
 This occurs in all the dialects. 5. The shifting  
 (*Lautverschiebung*) of consonants from one to  
 another degree of intensity within their organic  
 homogeneity. Jacob Grimm's scheme showing  
 the correspondences is as follows:

Greek .....	K	Γ	X	Π	Β	Φ	Τ	Δ	Ζ
Gothic, Saxon, Frisian .....	H	K	G	F	P	B	T	H	T
Old high German .....	G	O	H	K	B(V)	F	P	D	Z

The vowels *a*, *e*, *i*, *o*, and *u*, and the consonants  
*b*, *d*, *f*, *g*, *h*, *k*, *m*, *n*, *p*, *r*, *s*, *t*, *v*, and *z*, are com-  
 mon to all the dialects; beside which *ä*, *ö*, *ü*  
 (or *ae*, *oe*, *ue*) are used in modern high German;  
 and *c* is used instead of *k* in Anglo-Saxon, and  
 instead of both *k* and *s* in other dialects. The let-  
 ters *j*, *k*, *g*, *y*, and *x* are wanting in Anglo-Saxon,  
 where *co* occurs instead of *g*. The Gothic and  
 Northern *þ* represents the Greek *θ*, or the Eng-  
 lish *th* as in *thick*, and the Anglo-Saxon *ð* stands  
 for our *th* as in *this*; the *y* begins to be aban-  
 doned in high German, unless it occurs in Greek  
 and other foreign words; the high German *ch*  
 sounds like the Greek *χ* or Spanish *jota*.—The  
 old dialects had more flexional affixes than the  
 present. (See *GOOTHIC LANGUAGE*.) They also  
 show a trace of the dual number, as mentioned  
 above. The interrogative and relative pronouns  
 were written with *hō* instead of the English *wh*;  
 for instance, in Gothic *hwarjō*, which one of sev-  
 eral; *hwarthar*, whether. The Gothic and the  
 Scandinavian languages have a proper passive  
 form of the verb; there are also faint traces of  
 a middle voice in the Gothic and of a reflexive  
 form in old Norse. The present and past (vul-  
 garly called the imperfect) are the only simple  
 Teutonic tenses. The present was anciently  
 used instead of the future. Excepting in the  
 Scandinavian languages, the infinitive ends in *n*.  
 The ancient personal endings of verbs were:  
 1st person, *a*, or *e*; 2d, *s*; 3d, *th*, *t*; plural, 1st,  
*m*; 2d, *th*, *t*; 3d, *nd*. Conjugation was of two  
 kinds: 1, strong (wrongly called complex and  
 irregular), when the stem vowel undergoes  
 apophony in the past tense and in the passive  
 participle; thus:

Gothic .....	giba	gaf	gebun	gibana
Anglo-Saxon .....	gifa	geaf	geafon	gifon
Old Saxon .....	giba	ga	gebun	gibun
Old Norse .....	gaf	ga	gafun	gafnun
Swedish .....	giver	ga	giva	giva
Danish .....	give	gav	gave	given
English .....	give	gave	gave	given
Old high German .....	giba	gab	gabun	gabon
Middle high German .....	giba	gab	gabun	gaben
New high German .....	gabe	gab	gaben	gegeben
Latin .....	cap-to	cep-t	cep-erunt	cap(t)um.*

2. Weak (improperly called regular), without  
 apophony, indicating the corresponding forms  
 by the insertion of *d*, *th*, *t* between the stem

\* The signification of this word is inverted in the above  
 derivatives; but in English both the original and inverted  
 sense are used, in the words *keep* and *give*, in analogy to the  
 Latin *calidus*, warm, and *gelidus*, cold. These examples  
 are from the roots *c-p* and *g-l*.



and the ending; thus: Goth. *libaida*, *libaiþs*; Eng. *lived*; new high Germ. *lebte*, *ge-lebt*. (See GOTHIC LANGUAGE.)—We shall restrict our remarks henceforth to the new high German language. The 5 vowels *a*, *e*, *i* (*y*), *o*, and *u* sound as in Spanish; *ä* is like the English *ai* in *mail*; *ö* is somewhat duller than the French *eu* in *fau*; *ü* is also duller than the French *u* in *sur*. *O* before *e* and *i* (*y*), and *e* always, stand for *te*, as in English *pets*; *ck* for *kk*, as in English *peck*, *suck*; *g* is always hard, as in *get*, *give*, and is sometimes almost like *ch*, as in *ewig*, *weg*, or even like *y*, but only dialectically; *h* before a vowel has the same sound as in our *has*, *hen*; *ch* is harsher than *h*, and like the Greek *χ*, or the Spanish *jota*; *r* is always whirling. *S* has a threefold sound: 1, like the Latin *s*, in the combination *st*, at the end of a syllable, as *fest*, *Fürst*, and in forms derived therefrom, *festest*, *Fürsten*, &c., at the end of words, as in *das*, *guies*, &c., and when double, as in *nass*, *Wasser*, &c.; 2, like the English *s*, at the beginning of words, before vowels, and between vowels, as in *Sonne*, *dieser*, &c.; 3, like the English *sh* in *shell*, at the beginning of words before some consonants, as *Scandal* (Latin), *spät*, *still*, &c., where Low Germans and some others pronounce it like the English *s*. *Sch* is like the English *sh* in *shall*. *Se* stands for *ss* after long vowels or at the end of words, and is thus written in derivative forms, as *Mass* and *messen*. *Eu* has a very peculiar sound, approaching the English *oi*, and *äu* is somewhat heavier. *E*, the weakest sound, is most frequently employed, to wit: 1, for filling up the transition between consonants, thus, *er liebet* for *liebt* (the latter form is now more common); hence it is often elided, as *nah'n* for *nahen*, as in English *pow'r* for *power*, *heav'n* for *heaven*; 2, for lengthening *i* when that letter precedes it, as in *wieder*, again, distinguishing it from *wider*, against, counter; 3, as a mark of the plural, as *Steine*, stones, from *Stein*. *H*, the weakest consonant, is also used for lengthening a preceding vowel, as in *sehr*, *wohl*, &c. Beside *e*, 3 dentals and 3 liquids serve for all grammatical inflections. They are *d*, *s*, *t*, and *m*, *n*, *r*; *s*, *m*, *n*, *r* are employed with nouns, *d*, *s*, *t*, *n* with verbs. The following is a synopsis of all grammatical endings attached to words: nominative (of the definite article) *der*, *die*, *das*, plural *die* for all genders; genit. *des*, *der*, *des*, plur. *der*; dat. *dem*, *der*, *dem*, plur. *den*; accus. *den*, *die*, *das*, plur. *die*. These are the endings of all adjectives, nouns, and adjective pronouns. Comparative *dicker*, superl. *dickeſt*; receiving the preceding endings when declined. Endings of substantive nouns: singular genit. *es* or *s*, as *Dorf-es*, or like the nominative; dat. *e*, or like the nominative; plur. *e*, dat. *en*—new declension everywhere *en* or *n* (*des Falken*, &c.). Some substantives take *r* after *e* in the plural, and undergo apophony, as in *Bad*, *Bäder*, *Volk*, *Völker*, *Tuch*, *Tücher*. The verbal endings are as follows: 1. Strong verbs (commonly called old conjugation): indicative present, *e*, *est* or *st*, *et* or *t*; plural, *en* or *n*, *et* or *t*, *en* or *n*; past, 1st and 3d persons have

no ending, 2d *est*, or *st*; plural, *en*, *et*, *en*; imperative singular, 1st person wanting, 2d and 3d *e*; plural, *en*, *et* or *t*, *en*; participle past, prefix *ge*, suffix *en*. 2. Weak verbs (improperly called regular, really inorganic conjugation) have the same terminations as the preceding, except in the past tense, where *et* or *t* is inserted between the stem and the ending; participle past, prefix *ge*, suffix *et* or *t*. In both the ending of the participle present is *end*, infinitive *en*. The subjunctive of both has the endings always preceded by *e*, and the past of the strong verbs undergoes metaphony, as *ich gab*, I gave; *ich gäbe*, I might give. The strong verbs, whose conjugation is wrongly called irregular, exhibit the phonetic vicissitudes of words, and are therefore to be regarded as organic and containing the rules of the language; while the so called regular verbs are weak, undergo no change, and only admit of mechanical additions.—Although the essential bulk of the German language is of the same origin as that of the Latin, we consider those words to be Teutonic which have undergone such disguises as to appear at first sight to be *sui generis*. Such are especially those written with *pf*, *s*, *ch*, *w*, *f*, or *v*; for instance: *Pfau*, *Zehn*, *zehn* and *-zig*, *Becher*, *Wolle*, *flatt*, *Vater*, &c.; compare *pan-o*, *dig-itus* (*pedis*, Eng. *toe*), *dec-em* (thus *swan-zig*, *duo-dec-em*, 2x10), *pocal-e*, *vell-us*, *plan-us* (Gr. *πλar-vs*, broad), *pater*. All words of Teutonic physiognomy have the accent on the radical syllable; those taken from or resembling French, generally on the last effective syllable; and those from other languages on that syllable which to the German ear seems to be the radical; thus: *Empfindlich-keit*, sensibility; *unzuverlässig*, untrustworthy, &c.; but *Regiment*, *Solidarität*, *Kapitan*, &c.; *Aristoteles*, *So'krates*, &c. The German language has in a very high degree 3 qualities which render it both very plastic in its material and very flexible in its adaptability to all forms and categories of thought. Those qualities are: 1, intuitiveness of expression, owing to the organic etyma of the Indo-European family of languages, which are clearest in the Latin (see LANGUAGE); 2, facility of composition of simple words into double or manifold agglomerates, requiring lengthy paraphrases in other languages; 3, power of polysyllabic derivatives from radical words. These latter qualities do not impair the first. We conclude with some examples of these characteristics, and with a comparison of a few Anglo-Saxon phrases with Latin, English, and German. *Unersfänglichkeit*, uncaptionness, unprejudicialness, composed of *un*, not; *ver*, for (as in *forget*; Lat. *per*); *fäng-en* (to catch, seize; Lat. *fig-ere*; whence Eng. *fang*, *finger*); *lich* (Eng. *ly*, from *leicht*, light, easy; Lat. *lev-is*); *keit* (or *heit*, Eng. *head*, *hood*, as in *Godhead*, *manhood*; contracted from Lat. *qual-it-as*, as *quis*, *quid* are lengthened into *qualit-as*); hence, quality of not being lightly fanged (fixed, fingered).

*Willkommen*, *schöner* *Jüngling!*  
Wel-come, beautiful (shining) youth!

Die Wonne der Natur!  
Thou joy (win, gain) (of) the nature!  
Mit deinem Blumenkörbchen.  
With thy (the) flower-basketlet (Lat. *flor* and *corbulo-us*),  
Willkommen auf der Flur.  
Welcome on (upon, b'rep) the (dative) field (flat, plan).

The following lines exhibit the German in comparison with the Latin, Anglo-Saxon, and English:

Ego sum major	quam	ista media
Ic som ware	thonne	thes middan-
I am greater (grandior)	than	this middle
Ich bin grösser	als (alius, else)	diese Mittel-
ragto, minor	(plan) (Hof verm-ke,	
guard, laus	thonne land-wyrm,	
region, less	than	land worm,
Gepard, kleiner (in-clin-)	als	Land-Wurm,
leior — luna (men-sure),	celorior	
leior thonne moon,	swifter	
lighter than moon,	swifter	
leior als Mond,	schneller (schweifender)	
quem cel; maria (salia) mlti	sunt omnia.	
thonne ensis; scis	me sind alla.	
sun; seas	(to) me are all (belonging).	
— Sonne; Seen	mir sind alle (gehörig).	

—Among the most eminent of the founders of German philology are Benecke, J. and W. Grimm, and Lachmann. See J. Grimm, *Deutsche Grammatik*, comprising also the Scandinavian branch (Göttingen, 1819-'87); Hoffmann von Fallersleben, *Deutsche Philologie im Grundriss* (Berlin, 1836), with a bibliography of dialects; Pischon, *Denkmäler der deutschen Sprache* (6 vols. Berlin, 1838-'51); Wackernagel, *Deutsches Lesebuch* (3 vols., Basel, 1839-'43); J. Grimm, *Geschichte der deutschen Sprache* (Leipzig, 1848). For old high German see Graff and Massmann, *Althochdeutscher Sprachschatz* (Berlin, 1833-'44); for middle high German, Benecke, W. Müller, and Zarneke, lexicon (Leipzig, 1854). For grammars of new high German, see Ickesamer (1580); Albertus (Augsburg, 1573); Öttinger, *Unterricht der hochdeutschen Sprache* (Strasbourg, 1574); Olajus, *Grammatica Germanica Lingua* (Wittenberg, 1578); Martin Opitz, on German prosody (Brieg, 1624); Schottel, *Deutsche Sprachkunst* (Brunswick, 1641); Morhof, *Unterricht von der deutschen Sprache und Poesie* (Kiel, 1682); Bökler, *Grundriss der deutschen Sprache* (Cologne, 1690); Brann (Munich, 1765); Heynatz (Berlin, 1770); Basedow (Copenhagen, 1759-'72); Bodmer (Leipzig, 1775); Fulda, *Grundregeln der deutschen Sprache* (Stuttgart, 1778); Adelung, (Berlin, 1781-'2); Heinsius (Berlin, 1798); J. Ch. A. Heyse (Hanover, 1814); K. F. Becker (Frankfurt, 1829). For dictionaries, see Frisch, *Deutsch-lateinisches Wörterbuch* (Berlin, 1741); Adelung (Leipzig, 1774-'86); Moritz, *Grammatisches Wörterbuch der deutschen Sprache* (Berlin, 1793); Campe, *Versuche deutscher Sprach-Bereicherung* (Brunswick, 1791-'4), and *Wörterbuch zur Aufklärung und Verdeutschung der unserer Sprache aufgedrungenen fremden Ausdrücke* (1801; modified by Brandt, 1807-'18); Heyse, *Allgemeines Wörterbuch zur Verdeutschung*, &c. (Oldenburg, 1804); Heinsius, *Volkstümliches Wörterbuch* (Hanover, 1818-'82); Adler, *German and English* (New York, 1848); K. W. L. Heyse (Magdeburg, 1838-'49); J. and

W. Grimm, a gigantic work, not yet completed (Leipzig, 2 vols., 1852-'9). On synonymes, see Gottsched, *Beobachtungen über den Gebrauch und Missbrauch vieler deutscher Wörter* (Leipzig, 1758); Heynatz (Berlin, 1795); Eberhard (Halle, 1802); Maass, Wiegand, Ch. F. Meyer, &c. —GERMAN LITERATURE received its first impulse from the fondness of the early Germans for celebrating in song the fabulous and heroic associations of their traditions and history. The legends immediately connected with Gothic, Frankish, and Burgundian warriors of the period of national migration have for the most part some historical foundation, and many of them were eventually embodied in the lay of the *Nibelungen*, which is the most celebrated product of German mediæval poetry. The spirit of the *Nibelungen* is, according to Goethe, essentially pagan and mythological. Another sphere of literary activity was opened on the introduction of Christianity, manifesting itself as early as the 4th century in the translation of almost the whole of the Bible by Bishop Ulfilas, which is cherished by the Germans as the earliest monument of their ecclesiastical literature, although it was composed in the Gothic language. The British missionaries established cloisters and brotherhoods in Germany between the 6th and 8th centuries, and laid the foundation for that system of instruction which in the 8th and 9th centuries was perfected by Charlemagne. Metrical translations of the Gospels appeared in the 9th century in the old high and low German dialects, the former (*Krist*, new ed., Berlin, 1831) in rhymes, and the latter (*Heliand*, first published in Munich, 1830-'40) preserving the ancient alliterations. A translation of the Psalms by Notker, which dates from about the same period, is regarded as one of the best specimens of old high German literature. The *Ludwigslied*, a psalm in honor of the victory of the Frankish king Louis III. over the Normans in 883, which Herder extols as one of the best specimens of early German poetry, was composed in the old high German dialect by a Frankish churchman. The preservation of the song of Hildebrand, which is associated with the legends of Theodoric and Attila, is also due to churchmen, who transmitted it partly in the old high German and partly in the low German dialect. Several Latin poems were also based upon Hunnish and Burgundian legends, but with these exceptions the priesthood were generally opposed to the national poetry on account of its pagan associations. Many eminent Latin chroniclers and poets abounded in this and the following period; also a Latin poetess, Roswitha, or Helena von Rossow, who wrote Latin religious plays. The learning which flourished under the Saxon emperors was superior to that of the times of Charlemagne. The study of mathematics was next in importance to that of theology and Latin. The Greek language, although but little cultivated, was not unknown. From the 10th to the 13th century Germany probably possessed a higher mental cultiva-

tion than any other country in Europe, but it was on the whole of a Latin and ecclesiastical cast, and the people had no share in it. In the course of the 12th century appeared a hymn in praise of Hanno, archbishop of Cologne, which Herder calls a truly Pindaric song. Among the last poems which appeared in this era from the pen of churchmen were the *Rolandlied* and the *Alexanderlied*.—In the 12th and 13th centuries poetry passed from the monasteries and ecclesiastical schools to the palaces of princes and the castles of nobles. Most of the poets who then came forward were nobles by birth, some of them princes. Heinrich von Veldeke was the first to introduce into his heroic poem *Eneit*, which he is said to have composed after a French version of Virgil, the spirit of devotion to woman, or *Minne* (an old German word for love, whence the name *Minnesänger*). Veldeke is regarded as the originator of the heroic minstrel song, although he is far surpassed in genius, elevation of thought, and depth of feeling by Wolfram von Eschenbach. The other masters of the heroic muse were Gottfried of Strasbourg, Hartmann von der Aue, and Konrad of Würzburg. Their longer heroic poems treat chiefly of the exploits of Charlemagne and of the story of Arthur and the round table. At the same time they composed many songs. Love was their principal theme, but from a sense of delicacy the name of the lady who was the special object of adoration was never mentioned. Respect for womanhood, which was reckoned among the virtues of the ancient Germans even in the days of the deepest barbarism, contributed to make the German love songs more reverential than those of the French troubadours. A species of song peculiar to the bards was called watch songs, consisting in a dialogue between a lover and the sentinel who guards his mistress. Walther von der Vogelweide was the most gifted of these lyrical poets. Next to him rank Heinrich von Ofterdingen, Reimar der Alte, Heinrich von Morungen, Gottfried von Neifen, and the Austrian bards Nithard and Tanhauser. Several hundred of these poets were engaged in wandering from palace to palace and from castle to castle. The minstrels constituted what is called the Swabian school of poetry; the songs were mostly in the Swabian dialect. The accession of the Swabian emperors of the house of Hohenstaufen to the throne of Germany was the signal for the rise of the bardic art (1138). Its golden age was shortly before the fall of that dynasty (1254). The crowning event of the minstrel era was the appearance of the lay of the *Nibelungen*. It was followed at a subsequent period by the "Book of Heroes" (*Helden-Buch*), consisting of a collection of fragmentary pieces treating of the same legends as the *Nibelungen*, but mixed up with traditions of the crusades.—Didactic poetry began to be cultivated with some success in the 13th century. The dawn of historical works is heralded by several local chronicles; that of writings on natural history in the so called *Meinauer Naturlehre*;

of popular religious literature in the sermons of David of Augsburg and Berthold of Winterthur; and of works on jurisprudence in compilations of Saxon and Swabian laws (*Sachsen-Spiegel* and *Schwabenspiegel*). Ulrich von Lichtenstein deploras, in 1275, in his famous poem on *Frauentdienst* (devotion to woman), the decline of chivalry, but his attempt to revive its spirit was hopeless. Poetry now passed from the abodes of princes and knights to the homes of burghers and the workshops of artisans; and instead of *Minnesänger* we hear of *Meister-Sänger*, as the plebeian songsters were called. The 14th century, the greater part of which was so rich in poetical productions, was one of the most unfruitful for the cause of learning. Leibnitz says that the 10th century in Germany was a golden age in that respect compared with the 18th.—In the 14th century Germany possessed several mystic theologians, followers of Meister Eckart, the principal of whom was Johann Tauler (1294–1361), whose sermons and writings contributed to pave the way for the reformation. An important event of this century, in its general influence upon the future development of German literature, was the establishment of the university of Prague in 1348, soon afterward followed by universities in almost all parts of Germany. The last echoes of the period of chivalric poetry were two allegorical romances, *Teuerdank* in verse, and *Weiskünig* in prose (first published at the beginning of the 16th century), of which the emperor Maximilian is the hero and probably the author, although Melchior Pfinszinger is supposed to have composed the former romance at the emperor's request. The only good poetry of the 14th and 15th centuries were the spirited songs of Halbsuter and Veit Weber, celebrating the victories of Switzerland over Austria and Burgundy.—The progress of classical culture was stimulated at the opening of the 15th century by the foundation of the college of Deventer by Gerhard Groot (1400), and the subsequent establishment of many schools in imitation of it in different parts of Germany and the Low Countries. Hegius, Langius, Dringeburg, Reuchlin, Agricola, and other eminent men, were among the scholars. Purbach was the first restorer of mathematical science, and his pupil Regiomontanus (Johann Müller) was the greatest mathematician of the 15th century; while Gutenberg was one of its heroes. His invention of the art of printing produced a steadily increasing literary activity, and the books printed in Germany between 1470 and 1500 amounted to several thousand editions.—The 16th century opens with the foundation of the university of Wittenberg (1502), and inaugurates along with the reformation a new era in literature by Luther's translation of the Bible, which he rendered into German so harmonious and beautiful that it is still considered even at the present day as a model of elegant expression. The high German, as used by Luther, is so pure, that all the antiquated and anomalous dialects which had

until then alternately predominated in German composition were from that time more or less banished from the language, and the idiom of the Bible, which is now known as the high German (*Hochdeutsch*), has since become the sole medium of cultivated conversation and of German literature. Hymns and psalms were now brought to perfection. That famous religious lyric, *Eine feste Burg ist unser Gott*, and others of Luther's finest hymns, have become classical, and have found hosts of imitators, the most distinguished of whom were Decius and Speratus, and, in the 17th century, Paul Gerhard. Michael Weiss translated the hymns of Huss into German. The writings of Luther, Zwingli, and Johann Arnd, Bugenhagen, Bullinger, a theological work by Sebastian Frank, one on German theology by the Roman Catholic bishop Berthold, and a remarkable anonymous treatise, *Das Büchlein von der Theologie*, edited by Luther himself, constitute, beside the works by Melancthon, Ulrich von Hutten, and other reformers and scholars, the principal theological literature immediately connected with the reformation. In historical works, the influence of the reformation manifested itself in the superior style and greater comprehensiveness of the universal histories of Sebastian Frank and Sebastian Münster; also in chronicles of Switzerland by Tschudi, and of Bavaria by Aventinus. Frank also published a collection of German proverbs; in which branch of literature, however, he was preceded and excelled by Johann Agricola's *Auslegung deutscher Sprüchwörter*. Albrecht Dürer's writings unfolded original views of the fine arts in their connection with mathematical science. The principal events in prose belles-lettres literature were the translations into German of Latin tales, in which Boccaccio, Pogio, and other Italian novelists and poets, were for the first time introduced to German readers. Translations of Tasso and Ariosto also appeared. Many of the ancient chivalric stories, which had been published in prose in the 15th century, were republished in the 16th; collections of them were made and called *Volksbücher* (books for the people), of which the "Book of Love" (*Buch der Liebe*) became the most popular. The period before and after the reformation was especially fruitful in satirical and allegorical works. One of the most remarkable of the former kind was the *Narrenschiff* ("Ship of Fools"), by Sebastian Brant of Strasburg (new ed. by Zarncke, Strasburg, 1854), a metrical satire on the follies of the century, which, in the opinion of Hallam, may possibly have suggested to Erasmus his *Encomium Moria*. Thomas Murner imitated this in his *Narren-Beschörung* ("Conjuration of Fools"), and published one of his bitterest satires on Luther under the title, *Von dem grossen Lutherischen Narren* ("Of the Great Lutheran Fool"). The fable of *Reinolds Fuchs* (afterward immortalized by Goethe's poem), the origin of which is identified by many authorities with the ancient epic or didactic poem of the *Thiersage*, and

which in different periods had appeared in a variety of forms, was revived in a low German edition (translated from the Dutch) in the latter part of the 15th century, and was looked upon in the 16th as a satire on the government and state of society of Germany. It was followed by a great number of poems of the same kind, of which one whose heroes are fleas (*Flohate*) is the most witty. Among the purely didactic fabulists were Alberus and Waldia, both also eminent as composers of hymns. Among the more comic of the *Volksbücher* was the story of *Till Eulenspiegel*, relating the freaks, pranks, drolleries, fortunes and misfortunes of a wandering mechanic (new ed. by Leppenberg, 1854). The most able satirical and didactic poet of the 16th century was Johann Fischart (died 1591), the author of more than 50 works, including the above-mentioned fable on fleas (*Flohate*) and a romantic poem (*Das glückhafte Schiff*) which was regarded as a model for romancers. He has been called the German Rabelais. The story of Faust, and the autobiography of Götz von Berlichingen, afterward celebrated by Goethe, were also among the popular works of this century. The *Volkslieder* or popular songs of this period were much admired by Herder, who was the first to collect them. The *Meistersänger*, upon whom the mantle of the minstrels had fallen since the 14th century, had established metrical schools in various German towns, in the same spirit in which they would have founded guilds of trade. Their highest ideal of poetry was conformity to the rules of versification which were adopted by their school committees. In the 16th century their corporation derived great prestige from the genius of Hans Sachs, the poet and cobbler of Nuremberg (then the headquarters of the *Meistersänger*), whom Herder calls the *Meister of Meistersänger*, and who excelled more than any poet before him in all styles of composition, from the most tragical touch of feeling to the most comic turn of thought. His song dedicated to Luther (*Wittenbergische Nachtigall*) was especially fine. Frauenlob and Michael Behaim were also poets, and Rosenblüt and Folz playwrights of some note, the former of whom was also one of the best tale writers of his time. Among the contributors to the drama who succeeded Hans Sachs, he was excelled in skilful arrangement of plots by Jakob Ayser (died 1606), and in grace and refinement of composition by Andreas Gryphius (1616-'64).—During the excitement occasioned by the reformation almost all branches of composition were cultivated, but in learned and scientific literature the 16th century was most prolific. Beside Melancthon, whose influence secured the preponderance of the Aristotelian philosophy in the Protestant schools of Germany for over a century, there were Luther, Camerarius (classics and philology), Cornelius Agrippa, Theophrastus Paracelsus (mystical philosophy and natural history), Copernicus (astronomy), Leonhard Fuchs (botany and medicine), Conrad Gesner (botany, zoology, and classics), and Agricola

(mineralogy). At the expiration of the 16th century few of the great scholars of Germany were left, and classical culture was declining in the early part of the 17th. The numerous universities and schools which had sprung up under the influence of the reformation were no longer animated by the zeal of the reformers, but engrossed by subtle polemical and scholastic strifes. The deliverance of the German intellect from the scholastic bonds of the middle ages, which was the cherished endeavor of Luther, was again retarded.—Poetry, in passing from the *Meistersänger* to scholars, lost in naturalness what it gained in elaboration. Most aspirants to poetical fame in the 17th century were graduates of universities, and learned societies were formed at the beginning of the century, with a view of improving the German language and literature. These societies became as notorious for their imitations of the Italian academies as the corporations of the *Meistersänger* had been for attempting to mimic the minstrels. After their dissolution they were replaced by many literary and scientific associations in Leipsic, Berlin, Hamburg, Königsberg, Halle, and in other of those principal central and university towns of Protestant Germany which had become the leaders of German culture. A new school of poetry was established, of which the forerunners were Friedrich von Spee (1592–1635) and Georg Rudolf Weckherlin (1584–1651), the first author of sonnets in German. Martin Opitz (1597–1639) became the leader of this school, which after his native country was called the first Silesian school. He wrote the language with a purity of idiom in which he was only excelled by Luther. He imparted more vigor to the versification, laid down the laws of metrical composition, composed for the first time an ode in German, and wrote many lyrical, mixed, and didactic poems. Although more scholastic than poetical, he exerted a great influence on literature, at a time when the 80 years' war and the growing taste for bad Italian and French modes of composition threatened to annihilate all vestiges of pure German poetry, and when the reforms introduced by Luther into the language still required to be steadily urged and followed up in order to become established. Paul Flemming (1609–'40) was the principal lyrical, and Simon Dach (1605–'59) a gifted sentimental poet of this school. Von Zesen (1619–'89) was the greatest purist of them all, strenuously opposing the admixture of French words, which was becoming more and more common in Germany. Halsdörfer was one of the principal poets of the pastoral Nuremberg branch of the school. Among the other eminent poets were Christian Weise, who excelled in popular songs and the drama, and afterward opposed the Silesian schools, and Friedrich von Logau (1604–'55), a witty epigrammatist. Andreas Gryphius did much to improve the German drama, and his poetry was as excessively passionate as that of Opitz was conventional and cold. This conven-

tionality gave rise to a formidable opposition, at the head of which stood Hofmannswaldau (1618–'79) and Lohenstein (1685–'88), who took the most inflated Italian and French writers as their models, and became proverbial for bombast and artificiality. They in their turn were opposed by Canitz, the Berlin statesman and poet (1654–'90), Besser (1654–1729), and König (1688–1794), most of whom were court poets, who endeavored to imitate the then fashionable verses of Boileau, but were unable to resist the success of Lohenstein's affected and extravagant effusions. Imitativeness was the bane of literature in Germany; only a few, as Brookes of Hamburg (1680–1747) and Günther (1695–1728), were free from it, while Neukirch (1665–1729), and especially Wernike of Hamburg (died about 1720), were almost the only poets who dared to protest against it.—The most successful authors of novels in this period were Buchholz, Von Zesen, Ziegler, Klipphausen, Lohenstein, and the duke Anton Ulrich of Brunswick. The most entertaining book of the century was a collection of tales of adventures (*Simplicissimus*), by Grimmelshausen, a style of composition in which he had been preceded by the satirist Moscherosch. The writings of the Roman Catholic preacher Abraham a Sancta Clara (1642–1709) are distinguished by a broad humor, especially his *Judas*. Among the prose writers of the 17th century were Pufendorf in political philosophy, Kepler (who wrote in Latin) in astronomy, and Gottfried Arnold in ecclesiastical history. Among writers on theology and ethics, Spener, the founder of Protestant pietism, takes a prominent position; next, his pupil Hermann Francke, founder of the Halle orphan asylum; Scriver, Schupp, Lassenius, also Butschky, and above all the celebrated Reimarus. In philosophy and learning Latin continued to be the sole medium of literature; and Jakob Boehm (1575–1624), the great mystic, stood for a long time almost alone in the use of the vernacular tongue, until the latter part of the century, when Leibnitz (1646–1716) and Christian von Wolf (1679–1754) appeared. Christian Thomasius (1655–1728), the able jurist and pietistic philosopher and writer, was the first (in 1688), in his lectures at Leipsic and afterward at Halle, to substitute the German for the Latin language as the medium of instruction. He was also among the very first to use the German language in his writings, and established the first German learned periodical in Leipsic (1688–'90). Leibnitz was the first to lay a scientific basis for the study of philosophy in Germany, but his works were chiefly written in Latin and French. Wolf, his disciple, shaped the views of Leibnitz into a comprehensive system, and published his works in the German language.—Under the impulse of the new philosophical ideas, Germany became in the 18th century excited on the subject of literature, as it had been on that of theology in the 16th. The century opened with the foundation of the Berlin academy by Leibnitz (1700). The general clamor was for reform in education, in literature, and soon for reform in all departments

of thought. Gottsched in Leipsic (1700-1766), laboring in the same direction as Thomastius, exerted himself to make the German language the sole medium of instruction, and published in it manuals and abridgments of philosophy and science. He advocated the classical rules of composition of Racine and Corneille, but aimed above all at correctness. His views brought him into conflict with Bodmer (1698-1788), and Breitinger of Zürich (1701-'76), who were admirers of Milton and rigidly orthodox in religion, while Gottsched was friendly to Voltaire. They carried on a paper war in their respective journals, until at length many who had rallied round Gottsched became disgusted with his pedantry, and separating themselves from him, established a periodical celebrated in German literature under the name of *Bremer Beiträge*, edited by Gärtner (1712-'91), in which they opposed their former friend; at the same time they formed a poetical union to which Hagedorn was friendly, although he did not join it, but which was eventually joined by Klopstock, who became its hero. Among the contributors to this journal were Rabener (1714-'71), a popular satirist, of a correct and easy style; Zacharia (1736-'77), a writer of poetry in imitation of Pope's "Rape of the Lock;" Gellert (1715-'69), a famous fabulist; Kästner, the poet and mathematician; Gieseke; Johann Elias Schlegel, dramatist, and Johan Adolph Schlegel (1721-'98), poet; Fuchs; Oramer; Ebert, translator of Young's "Night Thoughts," and several others. The journal was printed in Bremen, but the poets resided for some time at Leipsic, whence they adopted the name of the second Saxon school, while the followers of Bodmer of Zürich styled themselves the Swiss school. Related to the latter was the school of Halle, to which belonged Lange, Pyra, Uz, Götz, &c. The most distinguished of the poets of this school were Kleist (1715-'59), author of descriptive and picturesque poetry in the manner of Thomson and Pope, and Ramler (1725-'98), a composer of odes, and the first to introduce the language, versification, and manners of the ancients into Germany. Gleim, or Father Gleim (1719-1808), the celebrated fabulist and poet, at first a follower of Bodmer, gathered a nucleus of writers around him, and exercised for about 40 years a considerable influence on German poetry; but his fame was diminished by the criticism of Herder. Salomon Gessner of Zürich (1730-'87) gained in his time a high reputation as a writer of idylls, but Herder thinks that he was overrated by his contemporaries. Bodmer's prestige was also soon broken by the criticisms of Lessing. Of greater influence than any of the poets as yet named were Hagedorn of Hamburg (1708-'54), whose fables and songs have immortalized him in Germany; and Albert von Haller (1708-'77), the illustrious physiologist and savant, who was remarkable as a writer of descriptive and didactic poetry. They were followed by Klopstock (1734-1803), whose "Messiah" made a profound impression upon the religious world by its mystic, devout, and rapturous faith, while as a work

of art it was thought to rival Tasso's and Milton's epics. The fashionable and elegant portion of society was attracted by the semi-Grecian, semi-Parisian muse of Wieland (1733-1813). But it was reserved for Lessing (1729-'81) to give a new direction to German literature. He did for it what Luther had done for the German language. He established a new school of criticism, and struck a final blow at Gallic influence, at the same time that Frederic the Great was coquetting with the French graces. His tragedy *Emilia Galotti*, his comedy *Minna von Barnhelm*, and his philosophical drama *Nathan der Weise*, are models of dramatical composition. He exerted a powerful influence on the progress of the German drama by unfolding for the first time all the beauty, vigor, and originality of Shakespeare before the German mind, and by the profound and philosophical criticisms in his *Dramaturgie*. He pronounced a condemnatory judgment upon all foreign models except Shakespeare and the ancients, and demonstrated that the spirit of the age shrinks from the mediæval sentimentality of epical poetry, and desires literature to reflect its own stirring energies, as the drama alone can do. Most celebrated among the many literary publications which were identified with Lessing's critical labors, was a periodical (*Literaturbriefe*) which he founded in Berlin in 1759, in conjunction with Nicolai (1733-1811), the publisher and author. Lessing was the master spirit of this publication, and the principal contributor next to himself was his friend Moses Mendelssohn (1729-'86). Both Klopstock and Wieland were criticized in that periodical, and it was the first to discover the merit of Winckelmann the archæologist, of Hamann the mystic philosopher, and the philosophical genius of Kant, although at that time he had only written some short treatises. Shortly after the commencement of this journal, a new influence was infused into the literary world by Herder (1744-1803), who while at Königsberg became acquainted with Hamann and Kant, and who was known as a scholar as early as 1762. He brought to bear upon literature an almost universal knowledge, the study of the poets of all nations, an intimate acquaintance with Hebrew, Greek, and Latin writings, and above all a cosmopolitan humanitarian spirit, which, together with his poetical genius, manifested itself most suggestively in the crowning work of his life, *Ideen zur Philosophie der Geschichte der Menschheit*. He contributed powerfully to promote the study of oriental poetry, and was the first to call attention to the beauty of the ancient popular songs of different nations, and particularly of his own. The earnestness and dignity of his character exercised at the same time a strong influence upon the great poets of his time, and he succeeded in imbuing other minds with his poetical conceptions, both by his personal intercourse with them and by his varied contributions to literature. Another great impulse was given by

Winckelmann (1717-'68). His examinations of the remains of ancient art and his writings modified all the old theories of the beautiful; and by his efforts, combined with those of Lessing, whose celebrated work *Laokoon* was elicited by Winckelmann's suggestions, the spirit of art and poetry was brought back to the genuine and simple taste of the Greeks. Heyne, the accomplished critic and commentator, propounded the theories of Winckelmann at Göttingen, then the most brilliant university of Germany. The young men there became deeply impressed with the new theories, and, under the influence of the reforms which were then initiated in religion, philosophy, literature, art, and education—in almost all departments of thought and life—founded in 1770 the *Musenalmannach*, a literary journal, and not long afterward a poetical union known as the *Göttinger Dichterbund*, or *Hainbund*. Klopstock became the leader and model of these enthusiastic youths, whose aim was to give a new stimulus to poetic emulation, and to oppose to conventional theories a school of poetry founded upon the inspiration of genius and humanity. Among the members of the union were Bürger (1748-'94), the author of *Lenore*, and of other wild and picturesque ballads and songs; Voss (1751-1826), one of the most learned and eloquent philologists of his day, immortalized by his translation of Homer, and the author of one of the best German idyls (*Luise*); Hölty (1748-1776), whose songs became exceedingly popular; the two Stolbergs, who coöperated with Voss in familiarizing the Germans with the ancients, and who excelled in various kinds of metrical composition; Claudius, Miller, Hahn, Cramer, Gotter, Boje, &c. A genial poet of this period was Pfeffel (1786-1809), whom however it would be difficult to class with any particular school. Goethe (1749-1832), already known to fame, and acquainted with Herder and other poets, but keeping himself aloof from all unions and parties, came forward in 1778 with *Göts von Berlichingen*, which was greeted as the commencement of an entirely new period in German dramatic literature. In 1774 appeared *Werther's Leiden*. The reformatory period of literature was now over. The revolution had set in, or the *Sturm- und Drang-Periode*, as it was called after a drama of that name by Klinger (1753-1831), whose high-wrought tragedies and novels, as well as the writings of Schubart (1789-'91), Heinse (1746-1803), Lenz (1750-'92), and Müller (1750-1825), reflect most forcibly the excitement of this epoch. In the mean time Schiller (1759-1805) produced his *Räuber*, followed by *Fiesco* and *Cabale und Liebe*. These impassioned tragedies gave a new impetus to the literary excitement. His *Don Carlos*, however (1784), shows greater moderation, and opens a long series of tragedies, in which the highest aspirations for liberty and humanity are interwoven with historical associations, expressed in language of the most classical purity. But it was only

after Schiller's union with Goethe (1795) that by their combined labors German literature was brought to that classical perfection which, from a purely local, has since given to it a universal influence. Schiller, by his enthusiastic and sympathetic eloquence and tenderness, became the favorite of the people; and Goethe, with his many-sided intellect and boundless sensibilities, controlled by a strong will, encased in a body of exuberant health and disciplined by an all-embracing culture and knowledge, became the acknowledged sovereign of German literature.—While this golden era of letters was in a great measure accelerated by the philosophic spirit of the age which had prompted the labors of Lessing and the other reformers, that spirit itself gathered strength from the light which it diffused, and in rapid succession gave birth to Kant (1724-1804), Fichte (1762-1814), Hegel (1770-1831), and Schelling (1775-1854). Lessing, especially, by his comprehensive essay on the "Education of the Human Race," Herder, Moses Mendelssohn, and Hamann are all philosophical writers of great eminence. In a popular style wrote Engel, the author of *Lorenz Stark*, and the psychological novels of Jacobi are among the most suggestive of German prose writings. Among other prose writers are Reinhold and Barth; Alexander Gottlieb Baumgarten, the founder of the science of aesthetics (in Latin); Meier, the German interpreter of his theories; and Sulzer, who wrote on the same science. Abbt, Garve, Liscow the philosopher and elegant fabulist, Lavater the physiognomist, his friend Zimmermann, and his sarcastic and polished opponent Lichtenberg; the historians Dohm, Möser, Schröckh, Schlözer, and Beck; Spittler, the celebrated Göttingen historian; Johannes von Müller, the historian of Switzerland, and one of the classical historiographers of Germany (1752-1809); Georg Forster, the teacher and friend of Alexander von Humboldt, an admirable writer, who opened the path of scientific study in German literature; the publicist Friedrich Karl von Moser; the educator Basedow, and afterward Pestalozzi; Campa, the writer of books for children; Nicolai, the friend of Lessing and author of the satirical novel *Sebalduß Nothanker*; Adelung, the philological writer; Böttiger, the antiquary; Sturz, the biographer; Mosheim, the ecclesiastical historian; Jerusalem, Spalding, Michaelis, Rosenmüller, and Ernesti, in theology; Eichhorn in theology and universal and literary history; Blumenbach, Herschel, Euler, Vega, and many other eminent writers in various branches of learning and science, belong to this period.—A peculiar and powerful writer, who stood quite alone in his idiosyncrasies, was Jean Paul Friedrich Richter (1763-1825). He puzzles the reader by his inability to assort his thoughts, which he pours out with the reckless *naïveté* of a childlike soul; but the obscurity is lighted up by flashes of humor and brilliant gems of thought and feeling. The influence of this genial philosopher was great, especially upon the women of Germany.

Novalis (Von Hardenberg, 1772-1801) was another strangely constituted writer, who uttered himself in poetic sighs rather than in vigorous words; but amid his morbid sentiments are scattered thoughts of such wisdom and spiritual insight that his poems and prose writings, although few and fragmentary, were sufficient to assign him a place among the classical writers and poets of Germany. He is regarded as the head of the so called romantic school, which draws its inspiration from the fabulous, mediæval, and chivalric eras of literature and history. Among the most brilliant masters of this school was August Wilhelm von Schlegel (1767-1845), the author of an antique tragedy, *Ion*, and of romances and elegies, but chiefly distinguished for his admirable metrical translation of Shakespeare, his critical and æsthetic writings, his lectures on the drama and its literature, and his labors connected with Indian literature and the Sanscrit language. His brother Friedrich von Schlegel (1772-1829) was also engaged in the study of Hindoo literature; but his speciality was the history of ancient and modern literature and the philosophy of history. The most original representative of this school was Ludwig Tieck (1773-1853), whose poetical dramatization and collection of ancient fairy and popular tales reflect the romance of mediæval poesy with beauty and genius, but with a mystic feeling bordering almost on superstition. Shakespeare and Camoëns are the heroes of his most celebrated novels. The writings of Tieck's friend Wackenroder (1772-98) were the first to enlist the sympathies of the German artists for the æsthetic principles of the romantic school. La Motte Fouqué (1777-1843) stands alone in German literature by his remarkable power of giving Ariel-like delinations of the mysteries of fairy lore, instinct with grace, loveliness, and spirituality, as for instance in his tale of *Undine*. Chamisso (1781-1838), the author of *Peter Schlemihl* and of many fine lyrics; Tiedge (1752-1841), the author of *Urania*; the Aristophanic Platen (1796-1835), and the mystic religious poems of Werner, all belong to this romantic school; and with but few exceptions, as for instance the patriotic and spirited poet Seume (1763-1810), most writings of this period are tinged with a morbid passion for romantic and sentimental views of life. This epoch comprises the lyrical poets, Schenkendorf (1788-1817), Stagemann (1768-1840), Kosegarten (1758-1818), Baggesen the Dane (1764-1826), Matthiessen 1761-1831), Mahlmann (1771-1826), Salis (1762-1834), and Eichendorff (1788-1857), many of whom belong to the romantic school. Among novelists and tale writers are Achim von Arnim (1784-1831) and Clemens Brentano (1777-1842), the compilers of a series of celebrated popular songs (*Des Knaben Wunderhorn*), and Ernst Theodor Amadeus Hoffmann (1776-1822), the author of many wild, fantastic tales and legends (*Elizir des Teufels*, *Kater Murr*, &c.) which cap the climax of the supernaturalistic element of the romantic school.

Among favorite novelists of this period are S. T. Hermes (1738-1821); Hippel (1741-'96), the indiscreet friend and disciple of Kant; Musæus (1785-'87), the author of a collection of *Volks-Märchen* or popular fairy tales; Lafontaine (1759-1831), a type of the most sentimental novelists; Aloys Blumauer, Johan Gottwerth Müller, and Moritz August von Thümmel (1738-1817), the author of an excellent novel in imitation of Sterne's "Sentimental Journey;" Jung Stilling (1740-1817), the tailor in whose naïve and original autobiography Goethe, Schiller, and Herder took so much interest; Knigge (1752-'96), the author of the *Reise nach Braunschweig*; and Immermann (1795-1840), the author of the famous novel *Münchhausen*. Ghost stories were for a time made popular by Schiller's *Geisterseher*. Associated with the romantic school, in the earlier part of her literary career, was Bettina von Arnim (1785-1859), celebrated by her correspondence with Goethe. Rahel, the wife of Varnhagen von Ense (1771-1838), was another literary woman of great talent and originality of thought. Among other renowned authoresses are Auguste von Paalzow, Ida von Hahn-Hahn, Fanny Lewald, Amalie Schoppe, Johanna Schoppenhaner, Friederike Brun, and many others. Talvj (Mrs. Robinson) has contributed to diffuse a knowledge of Servian popular songs and of Slavic literature generally, and has won great distinction in this and other spheres of literature.—The efforts of Klopstock, Herder, and other authors to revive the popularity of the early German poetry, as well as the sentiment of nationality which was roused at the beginning of this century by the aggressive policy of Napoleon I., have contributed to give a powerful impulse to the researches into the ancient German literature, which was to some extent fostered by Jahn's spirited work on *Deutsches Volkthum*. Von der Hagen, by his edition of the *Nibelungen*, has done much to promote a love for the study of the old German dialects and the poetry connected with them. The brothers Wilhelm and Jakob Grimm are the more immediate founders of this new branch of philological and poetical investigation. Georg Friedrich Benecke, Karl Lachmann, and Simrock labor in the same direction, and more recently Moritz Haupt; also Franz Pfeifer, Oskar Schade, Zarneke, Holzmann, Hoffmann von Fallersleben, Bartsch, &c.—The German war of independence against Napoleon I. produced some striking patriotic songs from Prof. Arndt of Bonn (born 1769), who in 1859 still sang against Napoleon III., and Theodor Körner (1791-1818), the gallant soldier-poet, and author of *Leier und Schwert* ("Lyre and Sword"). Some of the lyrical poets of the romantic school whom we have named also became distinguished for their patriotic effusions, especially Schenkendorf and Stagemann. Wilhelm Müller of Dessau (1794-1827), author of the admirable *Griechen-Lieder*, may be classed among patriotic poets. The maiden efforts of Fried-



rich Rückert (born 1789), one of the best lyrical and didactic poets of Germany, and celebrated as much for his imitations of troubadour songs as for his versions of oriental poetry, were also inspired by the war against the French. Another who came forward as a champion of national independence was Ludwig Uhland (born 1787), the veteran chieftain of the modern Swabian school, and one of the greatest living poets of Germany. Stuttgart, the seat of the great publishing house of Cotta and of the eminent critic Wolfgang Menzel, is the headquarters of this school. Johann Peter Hebel (1760-1826), whose *Alemannische Gedichte* were greatly admired by Goethe, belongs to it by the Swabian dialect and spirit of his songs, although he lived at an earlier period. One of the most eminent lyrical poets of this school is Justinus Kerner. Gustav Schwab, Gustav Pfizer, the critic and historian, Karl Mayer, Eduard Mörike, all belong more or less to the Swabian school. A new direction was given to literary activity by the political excitement immediately preceding and succeeding the French revolution of 1830. Ludwig Börne (1786-1837) and Heinrich Heine (1800-1856) are regarded as its heralds, the former by his pungent and comprehensive political satires, the latter by his penetration and philosophical insight and by his peculiar lyrical genius. Heine exercised a great general influence in the literary world. As a poet, he had a peculiar gift of uniting the tragic and comic in a felicitous and racy manner, which made him the idol of a new school of authors who style themselves "Young Germany," but who inherited much less of Heine's poetical gifts than of his political sympathies. Karl Gutzkow (born 1811) is the present head of this school. He is the author of *Die Ritter vom Geiste* (8d ed. 1854) and *Zauberer von Rom* (vol. 1, 1858, to be continued), and of many other political novels, and is one of the most active dramatists, *littérateurs*, and journalists of Germany; but he is more remarkable for talent and liberal aspirations than for genius. The other principal representatives of "Young Germany" are Heinrich Laube (born 1806), Gustav Kühne (1806), and Theodor Mundt (1808). An eminent author of this period is Baron Sternberg (1806), author of *Diane* and of *Paul*, and of many other works which hold up the mirror to the social and political condition of his country. Another famous writer and amateur liberal politician of this class is Prince Pückler-Muskau (1785), author of *Briefe eines Verstorbenen*, and of other piquant books. The taste for novels of a political and social tendency has been characteristic of German writers since the early part of this century. The novels of Gutzkow, Laube, and of many other contemporary German writers, all belong to this category, while Gustav Freytag has recently (1858) gained a high reputation by a social novel, *Soll und Haben* ("Debit and Credit"). The line of historical novelists was opened by Meissner (1758-1807); he was followed by Karoline von Fichler (1769-

1848), Von Tromlitz (Von Witzleben), 1773-1839), Van der Velde (1779-1824), Karl Spindler (born 1796), author of the *Jude*, the *Bastard*, and other novels, which enjoy a great popularity; Ludwig Rellstab, Ludwig Storch, Heribert Rau, and Heinrich Joseph König (born 1790), author of one of the best recent historical novels, *Die Clubisten in Mainz* (1847). Berneck or Bernd von Guseck (1808), Theodor Mütge (1806), author of *Toussaint* and of other excellent novels, Gustav Kühne and Robert Heller (1818), are all contributors to this class of novels. A far higher merit must be awarded to Zachokke (1771-1848), one of the best German prose writers of recent times, and author of many excellent historical and romantic works, and of *Stunden der Andacht*, a religious work, which has passed through some 80 editions. Heinrich Steffens, the Norwegian philosopher and naturalist (1773-1848), wrote German novels based upon Scandinavian history, which are replete with interest. The historical novelist, however, who excels all his contemporaries in poetical wealth and in classical attainments, is Wilhelm Haring, known by the pseudonym of Willibald Alexis (born 1793), who imitated so skillfully the manner and style of Sir Walter Scott that several of his works were translated into foreign languages and passed for some time as the productions of the great English romancer. The most famous of the kind is "Walladmor." Hauff, a genial novelist; Clauren, a licentious writer, but whose novels have been read extensively; and Hackländer's *Soldatenbilder* and other sketches, may be mentioned here; also Berthold Auerbach (1812), who in his "Black Forest Village Stories" has pointed out a new direction in the delineation of the life of villagers. The Swiss author Bitzins (Jeremias Gotthelf) labors in the same direction, but his writings are didactical. Stifter and Komperdt are also popular novelists.—Among the poets who have expressed liberal political tendencies with most point, are Hoffmann von Fallersleben, the author of *Unpolitische Lieder*; Georg Herwegh, author of *Gedichte eines Lebendigen*; Franz Dingelstedt, author of *Lieder eines kosmopolitischen Nachtwehlers*; Reinhard Ernst Prutz (born 1810); Gottfried Kinkel (1815), author of fine epic-lyrical poems; and Freiligrath, author of highly original poems, descriptive of tropical scenery, and of many popular songs. Among other poets of the present time who have acquired some eminence are Grabbe, Gottschall, Emanuel Geibel, Redwitz (author of a romantic epic, *Amaranth*), Paul Heyse (author of a poetical tale, *Urika*), Wolfgang Müller, Max Waldan, Bodenstedt (especially distinguished for his versions of Persian poetry), A. Böttger, K. Simrock, Fr. Kugler, Keller, Scheffer, and Hammer, many of whom excel in ballads and songs after the style of the Swabian school. A circle of poets in Vienna cluster round Anastasius Grün (Count Auersperg), the author of *Spaziergänge eines Wiener Poeten*, *Sohn*, *Der letzte Ritter*, &c. Lenau and Karl

Beck were the principal and most gifted of his followers. Alfred Meißner and M. Hartmann belong to this school.—Dramatic literature has also fallen from the high estate which it had reached through Lessing, Goethe, and Schiller. Gerstenberg (1787–1823) was the author of the high-wrought tragedy *Ugolino*, noticeable only for its extravagance. Among his contemporaries were some excellent dramatists and poets, as Cronegk, Leisewitz, Ch. F. Weiss, &c. Iffland (1759–1814), in a long series of plays, has reflected the life of respectable people of the middle classes; they are eminently moral in their tone, but intolerably long and heavy. Werner (1768–1823) became the founder of the so called tragedy of fate (*Schicksalstragödie*) by his piece called *Der Vierundzwanzigte Februar*. The imitators of his extravagant style are Müllner (1774–1839) in his *Schuld*, Howald (1778–1845) in his *Bild*, and Grillparzer (1791) in his *Ahnfrau*. Kotzebue (1761–1819) was one of the German writers for the stage who succeeded in obtaining a higher popularity than all his contemporary playwrights. His forte was in comedy. He wrote more than 200 plays; some of them have been adapted to the English and French stage. Münch-Bellinghansen (*nom de plume*, Friedrich Halm) has written an excellent drama, *Der Sohn der Wildnis*, and a national tragedy, *Der Fechter von Ravenna*. Maltitz, Eichendorff, Julius Moser, Gutzkow, Laube, Hebbel, Griepenkert, Prutz, and Brachvogel, have all cultivated dramatic literature. Charlotte Birchpfeifer has dramatized a great number of stories. Karl Immermann (1796–1840) belongs to a higher class of dramatists. His trilogy *Alexis*, and his mythical play *Merlin*, and many of his tragedies and comedies, are excellent reading plays, but they are not well suited to the stage. M. Beer's *Struensee* is also a work of high poetical merit. Raupach (1784–1852) was one of the most fertile of German dramatists. Eduard Diller (1809–1853) has written several historical dramas. The comedies of Hackländer, and particularly of R. Benedix, display considerable ability; and among other writers of comedy are Feldmann, Töpfer, Albin, Gutzkow, Gustav Freytag, and above all, Bauernfeld.—Belles lettres, on the whole, have fallen into insignificance in Germany since the death of Goethe (1832). The most eminent minds of Germany no longer devote themselves to poetic and dramatic literature, but to the exploration of the spheres of science and learning. Alexander von Humboldt (1769–1859) gave a powerful impulse to almost all departments of knowledge by his "Cosmos," by his "Travels," by his "Views of Nature," and by the general suggestiveness of his labors. While he marks a new epoch in the pursuit of the natural sciences, another great movement was initiated in historical researches by Niebuhr (1776–1831), the illustrious historian of ancient Rome; Schlosser (born 1776), the vigorous and truthful exponent of universal history, and particularly of the history of the 18th century; Heeren (1760

–1842), the investigator of history in connection with political and commercial relations; Raumer (born 1781), the historian of the Hohenstauffen; Leopold Ranke (1795), the historian of the popes; Dahlmann (1785), the German Guizot, author of "Sources of German History," and the historian of Denmark and of the English and French revolutions; Gervinus (1805), the historian of German literature, and author of the history of the 19th century; and Rotteck (1775), whose excellent universal history has been very popular on account of its liberal political views. While Niebuhr introduced a profounder method in the study of early Roman history, Bunsen, Lepsius, and others, made discoveries in Egyptian and oriental history, and a third impulse proceeded from the active researches in the field of classical archaeology and philology. These combined influences are more or less manifest in the labors in ancient history of Böckh, Karl Otfried Müller, Düncker, Droysen, Mommsen, Kortüm, Adolph Schmidt, Plass, Wachsmuth, Tittmann, Flathe, Manso, Abeken, &c. The history of the middle ages has been treated by Röhls, Rehm, Wilken, &c., and more especially by Leo, Hammer, Fälsmerayer, Aschbach, Lappenberg, Dahlmann, Schäfer, Röpell, &c. Oriental history and literature have been actively explored by Joseph von Hammer-Purgstall (1774–1856), author of *Geschichte des Osmanischen Reichs*, *Geschichte der Osmanischen Dichtkunst*, *Literaturgeschichte der Araber* (1850–'57,) &c. Lappenberg's History of England (3 vols., 1834–'37) has been continued by Dr. Reinhard Pauli. The 5th vol. appeared in 1858. This work is highly esteemed, as is Karl Friedrich Neumann's history of the English empire in Asia (Leipzig, 1858). Among writers on modern history are Dohm, Saalfeld, Bülow, Münnich, &c. The humanitarian and cosmopolitan direction given to historical studies by the writers and philosophers of the 18th and 19th centuries, and especially by Herder and Kant, is manifest in the comprehensiveness of views which Rotteck, and especially Schlosser, bring to bear upon their labors, as well as in many works on particular sections and occupations of the people. This has culminated in what may be designated as a new science, which the Germans call *Culturgeschichte*, i. e., a history which treats of the moral, intellectual, social, and politico-economical, as well as political development of the people. Among the principal laborers in this new sphere of investigation are Ernst Wilhelm Gottlieb Wachsmuth (born 1784), author of *Europäische Sittengeschichte* (1831–'9), and of *Allgemeine Culturgeschichte* (1850–'52); Johannes Scherr, author of *Geschichte deutscher Cultur und Sitte* (1852–'3, 2d ed. 1859); and Friedrich Gustav Klemm (born 1802), author of *Allgemeine Culturgeschichte der Menschheit* (1842–'52), and of *Allgemeine Culturoissenschaft* (1st and 2d vols., 1854). The same tendency to dwell upon the practical realities of life extends over many other departments of literature in Germany, and

is most strongly expressed in many recent biographies and autobiographies, especially in that of Perthes. A more physiological method in these branches of investigation has been adopted by Riehl in his *Naturgeschichte des Volks als Grundlage einer deutschen Socialpolitik* (3 vols., 1853-'55). A periodical for *Deutsche Culturgeschichte* was established in 1856 by Müller and Franke in Nuremberg, and a union for the promotion of this science in Weimar in 1857. Nuremberg has also been since 1857 the seat of a new national institution (*Germanisches Museum*) founded in 1853 for the promotion of researches in ancient German history and archæology, which are likewise calculated to throw more light upon the *Culturgeschichte* of the people.—The literature of travels was greatly stimulated by Johann Georg Adam Forster, commonly called Georg Forster (1754-'94), who accompanied Cook on his 2d voyage round the world, and who, in Alexander von Humboldt's opinion, inaugurated a new era of scientific voyages. A still more powerful impulse was given by Humboldt himself (1768-1859), by his travels in central Asia, &c., and by his famous journey to the equinoctial regions of America, in which Aimé Bonpland (1773-1858) was his companion. The travels of Lichtenstein (1780-1857) in southern Africa are of great scientific importance. The travels of Prince Maximilian of Wied (born 1782) have furnished valuable additions to the knowledge of the natural history and ethnology of Brazil and the United States. The explorations of Martius (born 1794) in Brazil are important for the studies of botany, ethnology, geography, and statistics. Pöppig (1797) has visited Chili, Peru, and the river Amazon. Among the other explorers of South America are Hermann Burmeister (1807), the historian of the creation, who travelled more particularly in Brazil, and Johann Jakob von Tschudi (1818), a relative of Friedrich von Tschudi, author of *Das Thierleben in der Alpenwelt*, and an active traveller, especially in Peru. Sir Robert Hermann Schomburgk (1804), a German by birth, but employed in the service of the British government, has travelled in British Guiana, Barbados, Hayti, &c. His works were published in German by his brother, Otto Schomburgk (1810-1857). Another brother, Moritz Richard Schomburgk, travelled in British Guiana at the expense of the king of Prussia, and is now in Australia in company with a 4th brother, Julius Schomburgk. The East has been visited by Gotthilf Heinrich von Schubert (1780), especially Egypt, Palestine, and Greece, and by Ulrich Jasper Seetzen (1767 to about 1815), whose *Reisen durch Syrien, Palästina, die Trans-Jordan-Länder, Arabia Peträa, und Unterägypten*, were edited by F. Kruse and published in Berlin, 1854-'9. The learned baron Heinrich Menu of Minutoli (1772-1846) wrote on his travels to Upper Egypt. Rüppell (born 1794) has explored Nubia, Kordofan, Arabia Peträa, and is best known by his travels in Abyssinia. The most eminent

writers on Egypt are Lepsius and Brugsch. Raumer (1781), the great historian, has given graphic descriptions of his travels in Venice, England, Italy, and the United States; and Joseph Russegger (1802) has written comprehensively on his travels in Europe, Asia, and Africa. Jakob Venedey (1805) has given accounts of England, Ireland, and southern France. Moritz Wagner (1818) has published his travels in Algeria, the Caucasus, Colchis, Persia, and Kurdistan, and, in conjunction with his companion Scherzer, on North America and Costa Rica. An English translation of the travels of Julius Froebel (1806) appeared in 1859 under the title of "Seven Years' Travel in Central America, Northern Mexico, and the Far West of the United States." Hettner (1821) has written sketches of his travels in Greece. Friedrich Gerstäcker (1816) is the author of many entertaining and humorous descriptions of travels, especially in the new world. Another pleasing narrator of his journeys is Theodor Mundt (1808). The most voluminous writer of travels is the tourist Johann Georg Kohl (1808). Ida Pfeiffer (1797-1868) was the most intrepid and indefatigable tourist of this or any century. Germany has also given birth to some of the most celebrated recent explorers of remote parts of the world, as Gützlaff in China, Siebold in Japan, Barth and Vogel in Africa, the brothers Schlagintweit in central Asia, and Leichhardt in Australia.—We conclude with a list of eminent men in the principal departments of learning in Germany, which includes many names already mentioned. In the natural sciences: Burmeister, Ule, Johannes Müller, Cuvier, Rossmässler, Dove, Giebel, Masius, Valentin, Moleschott, Büchner, Vogt, Oken, Burdach, Schleiden, Bernhard Cotta, Nees von Esenbeck, Leopold von Buch, Endlicher, Martius, Naumann, Bischoff, Liebig, Kopp, Poggen-dorff, Rose, Erdmann, Gmelin, Wöhler, Wackenroder, Gehler, Vogel, Mitscherlich, Schödlér, &c. In medicine: Johannes Müller (1801-'58), the great physiologist and comparative anatomist, Burdach, Wagner, Ehrenberg, Hecker, Cuvier, Blasius, Froriep, Schönlein, Skoda, Dieffenbach, Gräfe, &c. In astronomy and mathematics: Bessel, Encke, Struve, Mädler, Gauss, Lejeune-Dirichlet, &c. In geography, ethnology, statistics, and travels: Karl Ritter, Scherzer, Berghaus, Petermann, Möller, Stein, Streit, Barth, Fallmerayer, Handtke, Löher, Tschudi, Raumer, Dieterici, Hübner, Sydow, &c. In history and biography: Wachsmuth, Heeren, Niebuhr, Wachler, Gfrörer, Pöhlitz, Schlosser, Rotteck, Leo, Duncker, Karl Adolf Menzel, Lappenberg, Raumer, Ranke, Dahlmann, Gervinus, Preuss, Weber, Mommsen, Prutz, Droysen, Varnhagen von Ense, Pertz, K. W. Böttiger, Zimmermann, Von Rochau, &c. In the history of literature, philosophy, and aesthetics: Gervinus, Vilmar, Wackernagel, Julian Schmidt, Solger, Bouterwek, Viascher, Schwegler, Ruge, Ferdinand Wolf (Spanish and Portuguese literature), &c. Kuno Fischer (born in Silesia in 1824), since 1856 professor of phi-

osophy at Jena, the author of *Geschichte der neuern Philosophie* (1852-'55), &c., has already acquired a high reputation as a philosophical critic and historian. In the history of the fine arts: Kugler, Schnaase, Lütke, Nagler, Stieglitz, Weigel, Waagen, Passavant, &c. In historical and German philology: Lachmann, Wachsmuth, K. O. Müller, F. A. Wolff, Schaaf, Maurer, Böckh, the brothers Grimm, Heinsius, Heyse, K. F. Becker, Maassmann, Moritz Haupt, &c. In classical archaeology and philology: Wilhelm von Humboldt, Zumpt, F. A. Wolf, G. Hermann, K. O. Müller, Niebuhr, Bernhardt, Creuzer, Wachler, Con. Schneider, Ernesti, Curtius, Matthias, Thiersch, Jacobs, Buttman, Rost, Passow, Kühner, Ramshorn, Döderlein, Freund, Gerhard, &c. In oriental and Jewish branches: Gesenius, Bopp, Freytag, Jahn, Hitzig, Hupfeld, Ewald, A. F. Hoffmann, Lassen, Von Hammer-Purgstall, Zunn, Jost, Sachs, Frankel, Geiger, Philipsson, Hirsch, Grätz, Steinschneider, &c. In political sciences and jurisprudence: Savigny, Stahl, Karl Friedrich Eichhorn, Gans, Hüllmann, Welcker, Schubert, Stein, Bülow, Mohl, Gentz, &c. Jakob Joseph von Görres (1776-1848), author of many important historical, mythological, political, and polemical works, was a celebrated German publicist, and one of the most erudite men of the century. The most eminent of German bibliographers and cyclopædists was Johann Samuel Ersch. Prominent among the many-sided men of the age, and particularly distinguished for his Egyptological and historico-philosophical researches, is Chevalier Bunsen.—The principal learned periodicals are the *Göttingische gelehrte Anzeigen*; *Heidelberger Jahrbücher der Literatur*; *Gelehrte Anzeigen* and other academical journals of Munich and Vienna; *Anzeiger für Bibliographie und Bibliotheks-Wissenschaft* (Dresden, edited by Dr. Julius Petzholdt); *Serapion*, *Zeitschrift für Bibliotheks-Wissenschaft, Handschriftenkunde und ältere Literatur* (Leipzig, edited by Dr. Robert Naumann); *Zeitschrift für allgemeine Erdkunde*; Petermann's *Mittheilungen*; Poggendorff's *Annalen der Physik und Chemie*, and *Zeitschrift für Physiologie und vergleichende Anatomie* (founded under the auspices of Johannes Müller, edited since his death in 1858 by Prof. Peters); *Jahresbericht über die Fortschritte der reinen, pharmaceutischen und technischen Chemie, Physik, Mineralogie und Geologie* (Giessen, edited by Liebig and Kopp, with the coöperation of H. Buff, F. Knapp, H. Will, and F. Zammerlin), &c. Among the principal literary periodicals are the *Leipziger Repertorium der deutschen und ausländischen Literatur* (Leipzig, Dr. Gersdort); *Magasin für die Literatur des Auslandes* (Leipzig, Jos. Lehmann); *Minerva* (edited by Bran); *Grenzboten* (edited by Julian Schmidt and Gustav Freytag); *Deutsches Museum* (by Prutz); Cotta's *Vierteljahrschrift und Ausland*; Westermann's *Monatshefte*, &c.—See Wackernagel, *Geschichte der deutschen Literatur* (Basel, 1851); Gervinus, *Geschichte der poetischen Nationalliteratur der Deutschen* (Leipzig,

5th ed. 1852); Eichendorff, *Geschichte der poetischen Literatur Deutschlands* (Paderborn, 1856); Julian Schmidt, *Geschichte der deutschen Nationalliteratur im 19 Jahrhundert* (3d ed., Leipzig, 1856); Vilmar, *Geschichte der deutschen Nationalliteratur* (Marburg, 7th ed. 1857); Kurz, *Geschichte der deutschen Literatur bis auf die neueste Zeit* (3 vols., 1859, not yet complete).—For German philosophy, see PHILOSOPHY; for German art, see MUSIC, PAINTING, and SCULPTURE. (See also GERMAN THEOLOGY.)

GERONA, a maritime province of Spain, in Catalonia, bounded N. by the Pyrénées, E. and S. E. by the Mediterranean, S. and W. by Barcelona; area, about 3,000 sq. m.; pop. 262,600. The surface is chiefly covered with the ramifications of the Pyrénées, but fertile valleys frequently intervene. The inhabitants of the interior are mostly engaged in agriculture and cattle-rearing; those of the coast in ship-building, fishing, and navigation. The principal rivers are the Ter, Flavia, and the Llobregat.—GERONA (anc. *Gerunda*), a fortified city of Spain, and capital of the above province, stands at the confluence of the Ter and Ona, 52 m. N. E. of Barcelona; pop. 15,000. The chief manufactures are linen and woollen fabrics, soap, earthenware, and hardware. It was captured by Charlemagne, regained by the Moors, and is famous for the sieges it has sustained, among which that by the French under Augereau, in 1809, is remarkable for the immense losses of the besiegers.

GERRY, ELBRIDGE, one of the signers of the declaration of independence, and 5th vice-president of the United States, born in Marblehead, Mass., July 17, 1744, died in Washington, Nov. 18, 1814. He was graduated at Harvard college in 1762, engaged for several years in commerce, and was elected in 1772 representative from Marblehead to the general court or legislature of the state. He at once became a political leader, an associate of Samuel Adams, Hancock, and Warren, and continued from this time almost without intermission in public life. He was placed on the two most important committees, those of safety and supplies, which sat at Cambridge, on the day preceding the battle of Lexington; and as he remained through the night, he narrowly escaped capture by the British troops. The night before the battle of Bunker hill he spent with General Warren. He was soon after appointed judge of the court of admiralty, but declined the office. In Jan. 1776, he was elected a delegate to the continental congress, then in session in Philadelphia, where he was placed on the most important committees, and was generally chairman of the committee of the treasury till the organization of the treasury board in 1780, of which he became presiding officer. He retired from congress in that year, but resumed his seat in 1788, and on his reelection in the following year was said to have been longer a member of that assembly than any other man. As delegate to the convention which met in Philadelphia in 1787 to revise the articles of confederation, he

refused to sign the constitution proposed, but lent it his support as member of congress after it had received the sanction of the people. He served 4 successive years in congress, and in 1795 retired to private life, residing in Cambridge, till in 1797 he was appointed to accompany Pinckney and Marshall on a special mission to France, to avert, if possible, a rupture between the two countries. He was invited to remain in Paris, though his associates were soon ordered to quit the territories of France, and obtained the evidence and assurances upon which the subsequent commission acted. On his return he was unsuccessfully supported by the democratic party of Massachusetts for the office of governor in 1798, and again in 1801, but was elected after a violent canvass in 1810, and was reelected in 1811. In 1812 he was elected vice-president of the United States, but died suddenly in the second year of his term.

GERSE, a department of France, bounded N. by the department of Lot-et-Garonne, N. E. by that of Tarn-et-Garonne, E. and S. E. by Haute-Garonne, S. by Hautes-Pyrénées, and W. by Basses-Pyrénées and Landes; greatest length, 78 m.; greatest breadth, 58 m.; area, 2,425 sq. m.; pop. in 1856, 804,497. This department was formed from parts of the old provinces of Gascony and Guienne. The surface is in general hilly. Among its mountains is Mont d'Astarac, 1,180 feet above the level of the sea. It is watered by the Gers, Save, Adour, and several other rivers. The most important vegetable products are wheat, maize, oats, rye, peas, beans, onions, and fruit. Large quantities of wine and brandy are annually made. The minerals are marble, gypsum, potters' clay, marl, building stone, and a fusible spar used in making glass and porcelain. The only manufactures are coarse woollens, leather, bricks, glass, and earthenware. The number of wind and water mills is said to exceed 1,000. Capital, Auch.

GERSON, a rabbi of France, distinguished by the appellations *Rabbenu* (our master), *Hassaken* (the old man), and *Moor Haggolah* (light of the exiled), flourished in the 11th century, wrote a commentary on the Talmud, and is celebrated for the introduction of various substantial reforms among the European Jews, including the abolition of polygamy and repudiation, known under the name of "institutions (*gezeroth*) of Rabbenu Gerson."

GERSON, JEAN (CHARLIER), a French theologian, born at Gerson, near Rheims, Dec. 14, 1868, died in Lyons, in a convent of the Celestines, July 12, 1429. He was the eldest of 12 children. At the age of 14 he went to Paris to study the humanities and theology, and in 1887 he was selected by the university to be one of its deputation to Pope Clement VII. at Avignon upon the controversy concerning the immaculate conception. In 1895 he was made chancellor of the university of Paris. Charles VI. had just fallen into insanity, and while divisions menaced the state, the church was rent by a schism which produced 2 and afterward 3 pretenders

to the pontifical throne. Gerson exerted himself for the reform of morals and the banishment of scholasticism from the university, combated astrology, and resisted the invasion of the pantheistic doctrines which then had their seat in Brabant. When the duke of Orleans was assassinated by the duke of Burgundy in 1408, Gerson, at the peril of his fortune and life, denounced the murderer and delivered the funeral oration of his victim. Pursued by John the Fearless, he saw his house pillaged, and was obliged to conceal himself for a long time in the vaults of Notre Dame. He took the lead both as theologian and orator at the council of Constance, assembled in 1414 for the pacification of the church. He there maintained the superiority of general councils to the popes, and urged the deposition of both John XXIII. and Benedict XIII., and the election of a new pontiff. The schism was at length ended, but his efforts to check the abuses which reigned in the church were ineffectual; and as civil dissensions did not permit his return to France, he retired in a pilgrim's habit to the mountains of Bavaria, where he wrote his "Consolation of Theology." He returned to his country after a voluntary exile of 2 years, and found an asylum in a convent. Though one of the most active men of his age, he was also the most mystical of its thinkers. The restless chief of the university of Paris, he yet professed a religious philosophy which makes the ideal of human wisdom consist in silent prayer. He was the first who sought to give to the reveries of mysticism the character of a science. He recognized in the soul two classes of faculties—the cognitive or intellectual, whose highest act is simple intuition of divine things; and the affective faculties, whose highest act is ecstatic delight in God. Faith and penitence are the two wings on which the soul approaches the Infinite Being. To substitute this mystical philosophy for scholasticism was the aim of his writings. As many manuscripts of the "Imitation of Jesus Christ" bear the name of Gerson, that work is often ascribed to Gerson. The author of the "Imitation" expressed the hope that his name should be known to God alone, and men have in vain sought for certainty concerning it. The college of the Sorbonne and the larger number of German critics have ascribed it to Thomas à Kempis; some Italian ecclesiastics and the order of the Benedictines, to a certain Gerson of the 18th century; and many French scholars, including Mabillon and Bellarmine, have pronounced for Gerson.

GERSTÄCKER, FRIEDRICH, a German novelist and traveller, born in Hamburg, May 16, 1816. He was apprenticed to a merchant at Cassel, but soon conceived the plan of emigrating to America. He devoted himself in 1835-'6 to the study of agricultural economy, and in 1837 left Bremen for New York. After his arrival, he began a wandering and adventurous life, traversing the United States in all directions, now working his passage on steamboats, now hunting in the backwoods, and

finally settled in 1843 as hotel keeper at Point Coupée, La. In Louisiana he published parts of a journal he had written for his mother, of which extracts also appeared in Heller's *Rosen* in Germany. He returned to Germany in 1843, devoted himself to literary pursuits, and published successively his *Streif und Jagdsüge durch die Vereinigten Staaten Nordamerikas* (2 vols., Dresden, 1844); *Die Regulatoren in Arkansas* (3 vols., Leipzig, 1846); *Mississippi-Bilder, Licht- und Schattenseiten transatlantischen Lebens* (3 vols., Dresden, 1847); *Amerikanische Wald- und Strom-Bilder* (2 vols., Leipzig, 1849); and several minor works. He set out in March, 1849, for new travels, and at the expense of the bookseller Cotta and the ministry of the so-called vicar of the German empire, proceeded from Rio Janeiro, via Buenos Ayres and Valparaiso, to California, thence to the Sandwich and Society islands, and to Australia, and finally returned in 1852, via Batavia, to Germany. He has since resided near Leipzig. Of his recent travels he has given accounts in the *Ausland*, and the supplement of the Augsburg *Allgemeine Zeitung*, which were collected under the title of *Reisen* (Stuttgart and Tübingen, 1853-5), and have also been translated into English. Among his other books are many popular guide books for American emigrants and translations from the English. A French translation of several of his works appeared in 1858.

GERUND, in Latin grammar, a verbal neuter noun, having only the 4 oblique cases of the singular number, which serve as cases of the present infinitive active verb used substantively, and govern the case of their verb.

GERVINUS, GEORGE GOTTFRIED, a German historian and politician, born in Darmstadt, May 20, 1805. He entered a mercantile house, but determined to abandon business for study, and repaired in 1826 to the university of Heidelberg. After completing his studies, during which the lectures of Schlosser had inspired him specially with a love of history, he taught in an institution at Frankfort-on-the-Main, but soon returned to Heidelberg. He then studied several years in Italy, collecting notes and materials for historical works, and on his return to Heidelberg in 1835 was appointed extraordinary professor. He had already published a *Geschichte der Angelsachsen im Überblick* (Frankfort, 1830), and *Historische Schriften* (Frankfort, 1833), and in 1836 he was appointed ordinary professor of history and literature at Göttingen. He had now begun his important work *Die Geschichte der poetischen Nationalliteratur der Deutschen* (3 vols., Leipzig, 1835-8; 8d ed., 1846-8), the complement of which is the *Neuere Geschichte der poetischen Nationalliteratur der Deutschen* (2 vols., Leipzig, 1840-42; 8d ed., 1852). In these productions he traces the development of poetry in its relations to the progress of civilization and of society. He lost his chair at Göttingen in 1837 by being associated with Dahlmann, the brothers Grimm, Ewald, and other professors, in signing the protest

against the abolition of the Hanoverian constitution. In 1838 he made another journey to Italy, renewed his historical researches at Rome, and returned to Heidelberg, where he became honorary professor in 1844. He now took part in the political affairs of Germany, advocating liberal ideas, and published pamphlets which exerted an influence throughout the country. The Heidelberg address on the Schleswig-Holstein difficulty in 1846 was written by him. In 1847 he was one of the founders of the *Deutsche Zeitung*, the organ of the constitutional party, and as its editor-in-chief he had a prominent part in forming the constitution of 1848. A member of the diet and of the national assembly, he was more influential as a journalist than as an orator, though he engaged in the stormy debates on the constitution in Dec. 1848. In 1850 he went to England, where he made unsuccessful efforts in behalf of the duchies of Schleswig and Holstein, and on his return to Heidelberg resumed his historical writings. Among his later works is a study of Shakespeare (4 vols., Leipzig, 1849-50; 2d ed., 1850); a *Geschichte der Deutschen Dichtung* (5 vols., Leipzig, 1853); and a *Geschichte des neunzehnten Jahrhunderts* (Leipzig, 8d vol., 1858; English translation, 1859). The introduction to the last work (1858), in which he declared his republican doctrines, caused him to be arraigned before the tribunal of Baden, but the prosecution was abandoned.

GESENIUS, FRIEDRICH HEINRICH WILHELM, a German orientalist and biblical critic, born in Nordhausen, Feb. 3, 1786, died in Halle, Oct. 28, 1842. He studied at the universities of Helmstädt and Göttingen, taught at the pedagogical institute of Helmstädt, and was appointed in 1806 *magister legendi* at Göttingen, in 1809 professor of ancient literature in the gymnasium of Heiligenstadt, in 1810 subordinate, and in 1811 ordinary professor of theology in the university of Halle, where he remained to the end of his life, leaving his favorite university only for a scientific journey with Thilo to Paris and Oxford in 1820, or for short excursions through Germany. Making the study of the Semitic languages, and particularly of the Hebrew, the task of his life, Gesenius, by his numerous works, which evinced a most extensive and profound erudition, as well as by his lectures, which attracted a continually increasing number of students, succeeded in reviving an interest for this species of learning, comparatively neglected since the time of the Buxtorfs, and in founding a new school of biblical exegesis, chiefly based on an accurate, rational, and historico-critical study of philology. His works are: "Hebrew and Chaldaic Lexicon for the use of the Old Testament" (2 vols., Leipzig, 1810-12; 4th German ed., 1834; 2d Latin ed., 1846; translated into English by J. W. Gibbs, Andover, 1824, and by Edward Robinson, Boston, 1850); "Elementary Course of the Hebrew Language" (2 vols.), comprising a "Hebrew Grammar" (Halle, 1818, 16th edition by Rödiger, Leipzig, 1851; trans-

lated into English by M. Stuart, Andover, 1826, and by T. J. Conant, Boston, 1839); a "Hebrew Reader" (Halle, 1814; 7th ed. by De Wette, Leipsic, 1844; 8th ed. by Heiligstedt, 1851); "Critical History of the Hebrew Language" (Leipsic, 1815; 2d ed., 1827); *De Pentateuchi Samaritani Origine, Indole, et Auctoritate* (Halle, 1815); "Grammatico-critical System of the Hebrew Language" (3 vols., Leipsic, 1827); "Translation of the Prophet Isaiah, with a Philologico-critico-historical Comment" (8 vols., Leipsic, 1820-'21); *Thesaurus Philologico-Criticus Linguae Hebraicae et Chaldaicae Veteris Testamenti* (vol. i.-iii. Fasc. 1, 2d ed., Leipsic, 1829-'42). His contributions to the cyclopædia of Ersch and Gruber, and his notes to Burckhardt's travels, are valuable.

GESNER, KONRAD VON, a Swiss naturalist, called the German Pliny, born in Zürich, March 26, 1516, died there, Dec. 18, 1565. He studied under the best masters at Zürich, Strasbourg, Paris, Basel, and Montpellier, and was successively master of a school at Basel, teacher of Greek at Lausanne, and practising physician and professor of ethics and physics at Zürich. His first important work was a *Bibliotheca Universalis* (Zürich, 1545-'9), a vast collection, containing the titles of all the books then known in Hebrew, Greek, and Latin, with criticisms, summaries, and specimens. This is among the earliest works on bibliography, and has served as a model to many that have succeeded it. In 1555 appeared his *Mithridates de Differentiis Linguarum*, having accounts of 180 ancient and modern languages. His most important work, the *Historia Animalium*, with woodcuts, was published between 1551 and 1556, and is a summary of all that was then known of zoology, of the nomenclature, description, anatomy, habits, and uses of quadrupeds and aquatic animals. He then devoted himself to botany, and in his *Opera Botanica* gave particular attention to the flower and the fruit, and suggested the possibility of a classification by means of the organs of fructification.

GESNER, SALOMON, a Swiss painter and poet, born at Zürich, April 1, 1780, died in the same city, March 2, 1788. He showed little inclination for study in boyhood, but by reading the German poets, especially Klopstock, his mind was awakened. His father attempted in vain to engage him in his own business of book-selling, and allowed him to follow his inclination for poetry and landscape painting. He resided successively at Berlin, Hamburg, and Zürich, first becoming known by his poem on "Night," which was followed by "Daphnis," a pastoral in 8 cantos, by "Idylls," the "Death of Abel," in prose, a "Picture of the Deluge," some moral tales and dramas, and lectures on landscaping. Some of the engravings with which he illustrated his poems are worthy of the first masters.

GETA, P. SEPTIMIUS. See CARACALLA.

GETÆ, an ancient people mentioned by Herodotus and Thucydides as living S. of the Ister

(Danube), and by later writers among the tribes that lived N. of that river. Some critics regard them as identical with the Dacians, others with the Goths. Rawlinson, in his notes on Herodotus (iv. 98 and elsewhere), adopts the latter opinion as almost certain, and points to the "striking analogy of the compounds, Massageta, Thyssa-geta, and Tyri-geta, to the later names of Visi-goths and Ostrogoths."

GETHSEMANE, a retired place, containing about half an acre of land, on the W. side of Mt. Olivet, within a stone's throw of the brook Kedron, and commanding a full view of Jerusalem. The name, from two Hebrew words (*gath* and *shemen*) signifying oil-press, indicates the fertility of the spot, especially in olives. Though called a garden, it was probably a grove, laid out with walks, and affording shade and seclusion to those who resorted thither from the city. The Saviour often retired there for devotion. There he was in his agony in prayer, immediately after the last supper; and there he was sought and found by Judas, when he betrayed him. The place contains 8 large and venerable looking olive trees, the trunks of which show their great antiquity, and of which the traditions of the region would have us believe that they are the same under which Christ walked and prayed. The spot is now sandy and barren, and appears like a forsaken place. It is surrounded by a low broken wall, and is in the keeping of a fraternity of monks. The locality intended in the Scripture narrative is in some doubt, but the one above described corresponds with the required conditions.

GETTYSBURG, a post borough and the capital of Adams co., Penn., built on elevated ground in a rich farming country, at the intersection of several important roads with the turnpike from Philadelphia to Pittsburg, 114 m. W. of the former city, and 36 m. S. W. of Harrisburg; pop. in 1853, about 3,000. It is extensively engaged in the manufacture of carriages, is mostly well built, is supplied with good water conveyed in iron pipes from a neighboring spring, and contained in 1850 a brick court house, gaol, public offices, an academy, a bank, 7 churches, and 8 printing establishments issuing 8 weekly newspapers and 1 quarterly publication. It is the seat of a Lutheran theological seminary, founded in 1825, having 2 professors, about 20 students, and 7,000 vols. in its libraries, and of Pennsylvania college, founded in 1832, and having a president and 7 professors, 60 students, a library of 9,000 vols., and a medical department in Philadelphia. The college occupies a handsome Doric building, 4 stories high and 150 feet long. Several copper mines were opened near the town in 1851. The Wrightsville, York, and Gettysburg railroad affords communication with the Susquehanna river and with the N. central railroad of Pennsylvania.

GEULINOX, ARNOLD, a Belgian philosopher, born in Antwerp in 1625, died in Leyden in 1669. He studied and taught the classics and the Cartesian philosophy at Louvain for many

years, and at Leyden abjured Catholicism and gave private lessons in philosophy. His friends obtained for him the chair of philosophy in the university of Louvain, where he taught till his death the doctrines of Descartes, of whom he was the most remarkable disciple prior to Spinoza and Malebranche. In his writings are contained the germs of some of the doctrines of these philosophers, as the confusion of will with love, the vision in God, the hypothesis of occasional causes, and the absolute unity of substance.

GEYER, HENRY SKEFFIE, an American jurist, born in Fredericktown, Md., Dec. 9, 1790, died in St. Louis, March 5, 1859. In 1811 he began the practice of the law in his native town. He was an officer in the U. S. army in the war of 1812, at the close of which he removed to St. Louis, then a frontier village, where the remainder of his life was passed. He was a member of the territorial legislature of Missouri in 1818; was 5 times elected to the legislature of the state; and was speaker of the house of representatives in the first three general assemblies after the adoption of the state constitution. As one of the revisers of the statutes in 1825, he contributed more, perhaps, than any other individual to the adoption of a system of laws in Missouri superior to that of any other western state at that time. In 1850 the post of secretary of war was tendered to him by President Fillmore, but he declined it. In 1851 he was elected U. S. senator from Missouri, to succeed Thomas H. Benton. He was at the time of his death the oldest member of the St. Louis bar, both in years and in professional standing.

GEYSERS (Icelandic, *geysa*, to burst forth violently), intermittent hot springs found in various parts of Iceland. The principal locality is in the S. W. division of the island, about 85 m. N. W. from Hecla, and 70 from Reikiavik, the chief town. Here, in a circuit of about 2 miles, it is said over 100 springs may be counted which send forth hot water, 50 or more in the space of a few acres. These are on the lower slope of a small hill of trappean rock, and above them in the steeper part of the hill under the cliffs of this rock are banks formed by the incrustations of ancient and now nearly extinct geysers. The springs are of various dimensions, and exhibit various degrees of activity; some are uniformly full and quiet, others are constantly boiling, and others only at intervals, with explosive discharges of water and steam. The vapors arising from them fill the atmosphere around, forming clouds that are seen from among the mountains miles away. They are accompanied with sulphurous odors; and the geysers of other localities upon the island are found to deposit sulphur derived from the decomposition of iron pyrites contained in the days through which the hot waters penetrate. The chief spouting springs of the group are distinguished by the names of the Great Geyser and the Great and Little Strokr. The Great Geyser when quiet presents the appearance of a circular mound made up of silicious incrusta-

tions, enclosing a pool, the sides of which slope inward at an average angle of  $18^{\circ}$ , and outward at a mean inclination of  $8^{\circ}$ . The height of the mound on the lower side is about 20 feet, but only half as much on the upper side. Its diameter varies from 50 to 60 feet. In the centre is a well 10 feet in diameter, its mouth about 5 feet below the level of the surface of the water when the pool is filled. The total depth obtained by sounding is 78 feet below this surface. The pool is filled with water, except for 6 or 7 hours after a great eruption, by which it is emptied even to the depth of 4 or 5 feet in the well. At other times the water is constantly flowing out, at a mean temperature of  $185^{\circ}$  F. At intervals of about an hour and a half a rumbling noise is heard underground, and the water heaves up in the centre, throwing an increased quantity over the margin. The great eruptions take place at irregular intervals, sometimes exceeding 80 hours. At these times loud explosions are heard beneath the surface, the water is thrown into violent agitation, it boils furiously, and at last is suddenly sent forth in a succession of jets, which increase in force till they become an immense fountain, that is lost to view in the clouds of steam in which it is enveloped. The heights reached by these jets have been variously estimated by different travellers. The lowest estimate is 60 or 70 feet; that of Von Troil in 1772 is 92 feet; of Sir John Stanley in 1789, 96 feet; of Lieut. Ohlsen, a Danish officer, in 1804, determined by a quadrant, 212 feet; of Sir George Mackenzie in 1810, 90 feet; and of Henderson, in 1815, 150 feet. The discharge continues only about 5 minutes, when the geyser subsides to a state of tranquillity.—The Great Strokr, so named either from the Icelandic word meaning churn, or from *stroka*, to agitate, is only from 800 to 400 feet distant from the Great Geyser, from which it differs in appearance in being an irregularly formed well, incrustated with silicious deposits, but having little of the basin shape at its mouth. Its orifice is about 8 feet in diameter, diminishing to about 10 inches at the depth of 27 feet; the whole depth is a little over 44 feet. The water for the greater part of the time is 10 or 12 feet below the surface, but at intervals of half a day or thereabout it breaks forth in a great eruption like those of the Great Geyser; as observed by Henderson, this continued for  $\frac{1}{4}$  of an hour, during which an eruption of the Great Geyser also took place that lasted only 5 minutes. By throwing stones into the well of the Strokr, Henderson found he could bring on an eruption in a few minutes. The Little Strokr exhibits the same phenomena upon a smaller scale. There are in the same vicinity two large and quiet wells remarkable for their beautifully blue water. These were once active, and one of them was described by an English traveller as the Roaring Geyser. It became tranquil immediately after an earthquake in 1789, when the Great Strokr first broke forth. The deposits of silica which accumulate around



the geysers are derived from the small amount of this material which is taken up in solution by the hot water. By the analysis of Dr. Black, made upon 10,000 grains (about  $\frac{1}{4}$  of a gallon), it would appear that the whole amount of solid matter remaining dissolved in the cold water is only a little more than  $\frac{1}{1000}$  of the whole, the quantity examined yielding as follows: soda, 0.95, alumina 0.48, silica 5.40, muriate of soda 2.46, dry sulphate of soda 1.46; in all 10.75. As the water evaporates and is chilled, the excess of silica is added to the surface around, filling the interstices of the mosses and grass, and making of these silicious petrifications, while the living plants still thrive and shoot above the strong substance that binds together their roots and stems. Where the waters are found at a temperature of  $98^{\circ}\text{C}$ . ( $208.4^{\circ}\text{F}$ .), M. Descloiseaux observed that the confervæ still flourished. From the experiments of this savant and of M. Bunsen made in 1846, it appears that the temperature of the waters varies at different depths, as also at different periods between two eruptions, the changes always taking place in the same manner and with considerable regularity. Immediately before the eruptions there is a maximum temperature at the bottom of the well estimated at  $260.6^{\circ}\text{F}$ ., and a minimum immediately after of  $253.4^{\circ}\text{F}$ . The temperature of boiling water at the depth reached by the thermometer should be about  $276^{\circ}\text{F}$ . The water therefore is not thrown into ebullition at this point, but must be at some other, nearer the source of the heat, with which the geyser is supposed to be connected by a long and sinuous channel. Upon this are no doubt cavities in the upper portions of which steam collects. When an eruption has taken place, the temperature of the lower portions of the liquid column is reduced, the steam in the reservoirs has less tension than is required to counterbalance the weight of the column in the well and of the superincumbent atmosphere, and the water consequently subsides. As new steam is generated, it is for a time condensed in the water, which is below its boiling temperature, and to which it imparts its latent heat. This at last is thrown into ebullition, and the steam is accumulated in sufficient quantity to raise by its tension the column of water and project it into the air. The different sets of eruptions may be owing to the existence beneath the surface of reservoirs of different capacities and at different elevations. It has also been proposed to explain the phenomenon on the principle that water when long boiled, by the loss of the air it contains, requires a great accession of heat to throw it into ebullition, and that this is then apt to take place with a sudden production of vapor accompanied with violent explosion. It is a singular fact in the history of Iceland that no mention is made of the geysers until they are spoken of by Svenson, bishop of Skalpolt, in the 17th century; and this is the more remarkable, as Ari Frode, who wrote of the geography and history of the island in the 11th cen-

tury, spent his youth in their immediate vicinity. They bear unmistakable evidences of having been in operation in this district, if not in the exact spots where they are now found, from remote periods.—There are also geysers in California, in Napa co. about 60 m. N. of Napa City. They are formed by a number of hot sulphur springs, the water of which is continually boiling, and in several places is thrown up to the height of 10 or 15 feet.—The geysers of Iceland are treated of in the works named below: "Letters on Iceland," by Von Troil (1773); "Travels in Iceland," by Sir George Mackenzie (1810); "Journal of a Residence in Iceland during the years 1814 and 1815," by Ebenezer Henderson; "Visit to Iceland in the Summer of 1834," by John Barrow, jr.; "A Visit to Iceland," by the Hon. A. Dillon (1840); observations of M. Descloiseaux in *Annales de chimie et de physique* (April, 1847), and "Philosophical Magazine" (vol. xxx. p. 397); "Tracings of Iceland and the Farøe Islands," by R. Chambers (1856); "A Yacht Voyage," by Lord Dufferin (London, 1858).

GFRÖRER, AUGUST FRIEDRICH, a German historian, born March 5, 1803, in Calw, Württemberg. He studied theology at Tübingen from 1821 to 1825, was appointed in 1828 tutor (*Repetent*) in the theological seminary of Tübingen, in 1830 librarian at Stuttgart, and in 1846 professor of history in the university of Freiburg. He was also elected in 1848 a member of the parliament of Frankfurt. His first work, on Philo and the Alexandrine theosophy (Stuttgart, 1835), was written from the critical standpoint of the Tübingen school; but while preparing his "History of Primitive Christianity" (3 vols., Stuttgart, 1835-'6), he changed his views on Christ and Christianity, and arrived at length, during the publication of his "History of the Christian Church" (4 vols., Stuttgart, 1841-'6), at the opinion that the Roman Catholic church is the true church of Christ; but he did not join that communion till 1853. Beside the works already mentioned, he has written a "History of Gustavus Adolphus" (Stuttgart, 8d ed., 1853); a "History of the Carlovingians of Eastern and Western Franconia from 840 to 918" (2 vols., Stuttgart, 1848); a "Primitive History of the Human Race" (3 vols., 1855); and began in 1858 a "History of Pope Gregory VII.," which is intended to be in 5 vols.

GHARA, GHARRA, or GAARRA. I. A small river of Sind, Hindostan, flowing through a low, level country, and emptying into a long creek which conveys its waters to the Indian ocean, 10 m. E. of Kurrachee. The village of Ghara in the Kurrachee district is on its bank. II. A name given to the Sutlej in the Punjab, from its union with the Beas at Endreesa to its confluence with the Chenab, 800 m. lower down, after which it receives the name of Panjnad. Its course, though tortuous at intervals, is in general remarkably straight, its direction being nearly S. W. At Hureekes, a short distance below the mouth of the Beas, it is 600 or

700 feet wide, and about 12 feet deep, and runs with a velocity of  $2\frac{1}{2}$  m. an hour. In the S. part of its course, however, it becomes sluggish and muddy, with low alluvial banks which are frequently overflowed. Its waters are of a light color, while those of the Chenaub are reddish, and for several miles below their confluence the opposite sides of the united rivers preserve the difference of hue.

GHAUTS (literally mountain pass; whence, through the Teutonic languages, the English word *gate*), the name of two ranges of mountains in S. Hindostan. The principal of these is the western, which extends N. from Cape Comorin, the southern extremity of this country, in an almost unbroken chain of remarkably uniform topography, to the river Taptee, at the mouth of which is Surat, 800 m. N. of Cape Comorin. The general direction of the chain is parallel with the coast of the Indian ocean, which it approaches in one place within 6 m.; but being for the most part at a distance of 40 to 70 m., its summits are hardly discerned from the shores. On its western side it presents a front which rises boldly from the hilly country between the ranges and the coast; but on the east it gradually slopes away, or spreads in table-land, having an average elevation of about 3,000 feet above the sea, or is continued in long spurs, which stretch out through this central region, known as the Deccan. The country on the west, called the Malabar coast, is comparatively low, its average elevation being roughly estimated at 200 feet above tide. It is hilly, but also penetrated by creeks and bays making back from the sea; and it is traversed by extensive ravines, which are shaded with forest and jungle. But few gaps break the continuity of the chain, and only one of these is deep enough to drain the waters on the E. slopes into the Indian ocean. This point is in the S. part of the range against the Coimbatore country, from which the river Ponany flows through a break 16 m. wide. Opposite this break it is thought that ships navigating the Indian ocean experience the N. E. monsoons in greater fury than elsewhere. The average height of the western Ghauts is estimated at 4,000 feet, but some of the peaks rise much higher. Bonaseon is said to be 7,000 feet high, and Dodabetta in the Neilgherries 8,760 feet. The range, though often steep and stony, is not remarkably rough nor rocky. A deep rich soil covers the surface, and even upon the summits supports stately forests, such as are found only in the tropics. The bamboo attains an unusual height, rivaling that of the lofty palms which are scattered here and there among its detached clumps. The teak forms forests upon the mountain sides, and on the lower hills in the southern district of Travancore are magnificent forests producing pepper, cassia, frankincense, and other aromatic gums. In the most elevated regions no undergrowth or jungle is encountered, but the open woods afford unobstructed passage in every

direction. Roads, however, are maintained only at great cost, owing to the violence of the torrents of water during the rainy season; hence the passes across the range are few and difficult. These are occupied by military fortresses, which, with the unhealthiness of the climate and the dangers from lurking tigers, suggest considerations little in harmony with the natural beauties of these scenes. There are, however, points among the mountains noted for their salubrity, and on this account resorted to by Europeans, as some of the Neilgherries, and the village in the Mahableshwur hills, 80 m. S. E. of Bombay, made a convalescent station in 1828 by Sir J. Malcolm. The elevation of this point is 4,500 feet above the sea.—The Neilgherries, among which are some of the most elevated peaks of the range, occupy a tract of some 700 sq. m. on the E. of the main chain N. of Coimbatore. Here the eastern Ghauts are usually regarded as diverging from the western; but some trace them further S. through the Carnatic in the range of hills which meet the western Ghauts about 20 miles from Cape Comorin. Each range extends across to the Coromandel coast, and coming together in lat.  $18^{\circ} 20'$  N. the chain continues with the coast, some say even to Balasore, which is within 125 m. of Calcutta; but it is commonly regarded as running out before reaching the river Kistnah, thus limiting the eastern Ghauts to about 500 m. in length. Its hills are naked and rocky, and seldom attain the altitude of 3,000 feet. A glance at the map of southern Hindostan exhibits the chief peculiarity in the topography of the country included between the two ranges of the Ghauts and bounded on the N. by the Vindhya mountains. The drainage of this region is all toward the bay of Bengal. The greater elevation of the western Ghauts and the gradual slope of the country toward the E. and S. E. is betrayed, and the fact also that this country must be a very elevated region, as the mountains on the Coromandel coast are crossed by all these rivers far below their sources. A striking resemblance is perceived between the western Ghauts, ranging in front of the Indian ocean, and the Andes which look out upon the Pacific from the western verge of the South American continent. The long rivers commencing on their eastern slopes suggest the drifting of water-charged clouds across the range, which shed their moisture, as those driven by the trade winds discharge theirs upon the Andes. Such clouds are in fact brought alternately from either sea, as the monsoons, after setting all the summer months from the S. W., turn when the sun ceases to parch the desert plains of central Asia, and, in the regular N. E. trades, blow from the sea of Bengal upon the E. coast. The S. W. monsoons commence in May and June, with terrific storms of thunder and rain, which vent their greatest fury upon the western Ghauts. The clouds, but half discharged, are swept on over the hills of the Deccan, watering them with less copious showers. This contin-

ues until October. During this time that part of the Coromandel coast under the lee of the eastern Ghauts receives no rain; but about the mouth of the Godavery the clouds arrive still charged with it; and further to the N. they are not wholly deprived of it, until they reach the snowy regions of the Himalaya. In October these winds fail, and the regular N. E. trades or monsoons set in with terrible thunder and lightning and hurricanes on the bay of Bengal, producing while they last, which is to about the close of the year, the rainy season on the Coromandel coast and the eastern Ghauts. But under the lee of the western range this is the dry season, a season of fair weather with occasional southern gales. The quantity of rain precipitated upon the western Ghauts during the summer is unprecedented in any other part of the world in the same length of time. At the station of Mahableshwur, already referred to, it has been found equal to 289 inches. The mean annual fall upon the American continent is 89 inches. Such deluges of water pouring down the steep western slope of the range may well produce the extensive ravines which traverse the Malabar country.—In their geological structure both ranges of the Ghauts appear to agree with other great N. and S. mountain chains of the world. Their rocks are the metamorphic schists, which contain rich metals and valuable ores. Gold is found pretty generally diffused along their course, and is especially abundant in the Neilgherries. Copper ores are worked in the eastern Ghauts near the sources of the Pennar river, about 40 m. N. E. from Cuddapah. In the same region of the Carnatic, only 7 m. N. E. from Cuddapah, diamonds have been found for centuries past; and 2° further N., in the province of Hyderabad, is Golconda, celebrated of old as the depot of precious gems found in the regions watered by the Pennar and Kistnah rivers. From the table-lands of Mysore, which border the eastern Ghauts on the N. W., are brought the precious ruby, topaz, chrysolite, cats-eye, garnet, beryl, &c. The region of the carnelian is in the province of Guzerat, which is beyond the N. extremity of the western Ghauts, the outlet of which is Cambay. (See CAMBAY STONES, and CARNELIAN.) The famous diamond region of Pannah in Bundelcund, supposed to be the Panassa of Ptolemy, is also beyond the limits of the Ghauts, in the Vindhya mountains, which, stretching across central Hindostan, connect the N. terminations of the E. and W. chains. Iron ores of the richest qualities are found in abundance along the Ghauts on both sides of the peninsula of Hindostan. They are successfully worked in the rude forges of the natives in Malabar, Mysore, and Bejapoor, both into wrought iron and steel; and the bar iron of the district of Orissa, shipped from Balasore, is a merchantable article in the market of Calcutta. At Porto Novo, S. of Madras, are the extensive iron works of the East India iron company, which also has an-

other establishment at Beypoor on the opposite side of the peninsula of Malabar.

GHAZIPOOR, or GHAZEKPOOR, a district of British India, under the Lieut. gov. of the N. W. provinces; area, 2,187 sq. m.; pop. 1,586,824, of whom 1,438,085 are Hindoos. It is bounded N. and E. by the Goggra, S. by the Gangea, and W. by the Juanpoor. It is a low, level country, diversified by many shallow lakes and well irrigated by nature and by art. The climate is healthy, except in the latter part of autumn, when fevers of a mild type prevail. The thermometer ranges from 58° to 98°. Its best known productions are rose water and attar of roses, for which many hundreds of acres of the flowers are cultivated, and its chief agricultural crops are maize, wheat, pulse, barley, oats, rice, indigo, oil seeds, gram, tobacco, opium, and sugar. Cotton is grown to some extent. Ghazipoor was anciently subject to the sovereigns of Ayodha (Oude), and after passing through the hands of those of the Kanouj, Patan, and Mogul dynasties, was seized by Surajah Dowlah, vizier of Oude, about 1761. The Mogul Shah Alum granted it in 1764 to the East India company, by whom it was relinquished to the vizier of Oude in 1765; the latter ceded it again to the British by the treaty of 1775.—GHAZIPOOR, the chief town of the above district, is situated on the left bank of the Gangea, 46 m. N. E. from Benares, and 481 m. N. W. from Calcutta; pop. 38,573. It stands on high ground, enclosed by beautiful groves of banyan and pipal, and is noted for its healthy climate. At its E. end is the palace of Meer Cossim Ali, nabob of Bengal.

GHEE, a kind of butter used in many parts of India, prepared generally from the milk of buffaloes. The milk is successively boiled, cooled, and mixed with a little curdled milk. The process is completed by churning the curdled mass, to which some hot water is once added. It is an article of commerce in India, but unpalatable to Europeans from its strong smell and flavor. It may be kept from rancidity by boiling till all the water is evaporated, and then adding curdled milk and salt, and preserving it in close jars.

GHEEL, a town and commune of Belgium, in the province and 26 m. S. E. of Antwerp; pop. 10,720. It has several churches and some manufactures. The commune has from time immemorial been a sort of asylum for insane persons, who are lodged and boarded in the houses of the peasantry.

GHEGA, CARLO DE, an Italian engineer, born in Venice in 1808, studied at Pavia, officiated as engineer in the construction of public works and railways in various parts of Italy and the Tyrol, visited the United States in 1842, and afterward wrote on the system of railways and bridges employed in the mountainous regions of the United States. As inspector in chief of the Austrian government railways, he superintended the railway through the Alps, and projected the celebrated passage over the Semmering.

GHENT (Flem. *Gend*; Fr. *Gand*; Ger. *Gent*), the capital of the Belgian province of East Flanders; pop. in 1857, 108,925. It is situated at the junction of the Scheldt and the Lys, 45½ m. by rail from Brussels, and intersected by a great number of navigable canals which communicate with those rivers, and form 26 islands connected with each other by about 80 bridges. The streets are spacious, and the fantastic variety of gable ends, rising stepwise or ornamented with scroll work and carving, imparts great picturesqueness to the stately houses. It has about 300 streets, 28 public squares, fine promenades, and a great number of churches. The sumptuous cathedral of St. Bavo contains the masterpieces of Jan and Hubert van Eyck. The city hall, with its Moorish front, the famous belfry, and the *Vrydagmarkt*, or Friday square, where Jacques van Artevelde kindled the flames of civil war, and where the duke of Alba lighted the fires of the inquisition, are celebrated for their historical associations. The city is rich in charitable, industrial, artistic, literary, and scientific institutions, and possesses a university attended by about 300 students, with an extensive library and a botanical garden. There are 21 public hospitals, of which that called Bylogue can accommodate 600 persons. The *palais de justice*, the central prison, and the Béguinage, the principal establishment in Belgium of the Beguin nuns, are worthy of special mention. The cotton manufacture employs about \$9,000,000 of capital and upward of 20,000 persons, and produces annually 1,000,000 pieces of plain and printed calicoes. Sugar refining is also extensively carried on. The principal articles of trade are corn, oil, seeds, wine, and Flemish linens, of which about 20,000 pieces are exposed for sale every Friday.—Ghent is first mentioned as a town in the 7th century. It acquired importance during the middle ages, when the citizens established a form of municipal government, joined the association of the Hanse towns, and obtained the free navigation of the Rhine and other privileges. Toward the end of the 12th century it became the capital of Flanders, and by the end of the 13th it had so much increased in wealth and power that it was thought to eclipse Paris; and at a subsequent period Charles V. used sportively to say that he could put Paris into his *Gant* (glove). This emperor was born in Ghent, as was also John of Gaunt, "time-honored Lancaster," who derived from it his appellation. As early as the 14th century, the age of the Artevelde, Froissart estimated the number of fighting men whom Ghent could bring into the field at 80,000, no doubt an exaggeration. At the end of the 15th century there was, according to Erasmus, no town in all Christendom to be compared to it for size, power, political constitution, or the culture of its inhabitants. By its jurisdiction over many large but subordinate towns, Ghent controlled more than its own immediate population, which has been estimated as high as 200,000, although it possibly did not much exceed 150,000. The

constitution of the city was very liberal, and in all but theory it was a republic. All this prosperity was destroyed by the insurrection that broke out in the early part of the 16th century, which originated in the resistance of the citizens against onerous taxes. The emperor punished this resistance by depriving the city of all its privileges and immunities (April 29, 1540). The revenues belonging to it were confiscated; its ancient form of government was abolished; the right to appoint the city magistrates was vested in the crown; a new system of laws and political administration was established, and orders were given for erecting a strong citadel in order to bridle the revolutionary spirit of the population. A large fine for defraying its expenses was imposed upon the unfortunate citizens, as well as an annual contribution for the support of the garrison. At the same time 26 of the principal citizens were put to death, and a greater number sent into banishment. A congress assembled in Ghent in 1576 to form a confederacy for the expulsion of the Spaniards from the Netherlands. The massacre of Antwerp and the eloquence of the prince of Orange produced a quickening effect upon its deliberations, which had proceeded with decorum while the citadel was being cannonaded. The latter fell on the same day (Nov. 8, 1576) which saw the conclusion of the treaty known under the name of "Pacification of Ghent." But in the stormy period which followed, and in which the revolt against the Spanish authority was varied by intestine dissensions, the city became a prey to riot and anarchy. Early in the spring of 1584 a formal resolution was passed by the government of Ghent to open negotiations with Spain, and within 8 months after the murder of William of Orange, whose policy and self-sacrifice had saved the city on many occasions, it fell into the hands of the duke of Parma, the Spanish viceroy (Sept. 17, 1584). The citadel was rebuilt, and about a third of the population left the city. Before the expiration of the century, however (1596), Ghent, along with the other cities and provinces of the Netherlands, was severed from the crown of Spain in favor of Isabella, daughter of Philip II., who married Albert, son of the emperor of Germany. Louis XIV. took it in 1678, but soon after restored it to Spain in the peace of Nimeguen. During the war of Spanish succession, at the end of which it was given by the treaty of Rastadt to Austria, Ghent was alternately in the hands of both contending parties. It was also taken by the French in the war of the Austrian succession, and twice in the campaigns of the revolution, when it became the capital of the French department of the Scheldt. After the downfall of Napoleon in 1814 it was attached to the kingdom of the Netherlands. During the Hundred Days Louis XVIII. took refuge in Ghent. The famous *Moniteur de Gand* was issued there under the editorship of Baron Eekstein and M. Guizot and other friends of the Bourbons who gathered round Louis XVIII. The revolution

of 1880 made Ghent, with Flanders, a part of the new kingdom of Belgium.—Ghent is associated with American history by the treaty concluded there, Dec. 24, 1814, which terminated the war between Great Britain and the United States. The British commissioners for negotiating it, Lord Gambier, Messrs. Henry Gouldburn and William Adams, arrived in Ghent in Aug. 1814, where they found the American commissioners, Messrs. Adams, Gallatin, Bayard, Clay, and Russell, already assembled. The treaty, as signed, provided for the mutual restoration of all conquered territory, and for the mutual appointment of commissioners to examine and report to their respective governments on certain disputed boundary questions. Hostilities on land were to terminate with the ratification of the treaty, and on the ocean in certain specified periods, according to distance, of which the longest was 4 months.

**GHERARDI DEL TESTA**, TOMMASO, count, an Italian dramatist, born near Pisa in 1818, was graduated in 1826 as a doctor in law at the university of Pisa, and began to practise his profession in 1831. Subsequently he devoted himself to literature; and his first comedy, *Una folla ambiziosa*, was favorably received in Florence in 1845. He has since produced over 40 plays, the most celebrated of which are *Le scimmie* and *Le due sorelle*. Among his most recent plays is *Gustavo III.*, performed in Turin in the latter part of 1855. He has also written poems, the best of which is *Il Creatore ed il suo mondo*. He fought for the liberty of his country in 1848, fell into the hands of the Austrians (May 24), and was held in prison in Bohemia until the capitulation of Milan (Aug. 6).

**GHERIAH**, or **VIZIADROOG**, a town and fort of the Bombay presidency, British India, in the collectorate of Rutnagherry, S. Concan, 170 m. S. of Bombay. It has a safe harbor at the mouth of the river Kunvee, unobstructed by a bar and with a depth of 8 or 4 fathoms. The fort, built by the Mahratta chief Sevajee in 1622, stands on a bold promontory on the coast of the Indian ocean. It received the name of Gheriah from the Mohammedans, while by the Mahrattas it was commonly known as Viziadroog. During the maritime contests of the latter people with the Mogul emperors in the 17th century, one of their chieftains named Conajee Angria, who from a low station had risen to be admiral of the fleet and governor of the fortress of Severndroog, revolted against the Mahrattas with part of the fleet, and made himself master of the coast from Tanna to Rajapoor. Under this adventurer and his successors, who all bore the family name of Angria, Gheriah became the centre of a vast system of piracy, which swept the adjacent seas for upward of 50 years. Several attempts were made to disperse the corsairs. The Portuguese and English attacked them in 1732; the Dutch made a fruitless demonstration against Gheriah in 1724. In March, 1755, a British fleet under Commodore James, followed by

some Mahratta vessels, attacked Angria's fleet at Severndroog. The pirates escaped by fast sailing, but the town was bombarded and partly burned, the Mahrattas, who were only anxious for plunder, keeping beyond cannon shot till all was over. Toward the end of the same year reinforcements arrived from England, and the reduction of Gheriah was at once determined upon. On Feb. 11, 1756, Admiral Watson with 8 ships, a grab, and 5 bomb ketches, having on board 800 Europeans and 1,000 sepoys commanded by Col. Olive, arrived off the promontory, while a Mahratta army approached on the land side. The pirate fleet was soon burned; a furious bombardment silenced the guns from the fort; the troops were landed, and on the 18th, after a feeble resistance, the place was taken. It was given up to the peishwa under a treaty concluded with the Mahrattas the same year, and passed into the hands of the East India company in 1818.

**Ghibellines**. See **GUELPHS** AND **Ghibellines**.

**GHIRBERTI**, **LORENZO**, an Italian sculptor and painter, born in Florence in 1378, died there about 1455. The son of a goldsmith, he early learned to imitate ancient medals, and began to exercise himself in painting. The signory and merchants of Florence determined in 1401 to procure for the baptistery of San Giovanni a bronze folding door to correspond with that already made by Andrea Pisano. A competition was opened, and 7 illustrious sculptors, of whom Ghiberti was one, contended for the prize, each of them to execute as a specimen of his talent a base-relief of the "Sacrifice of Isaac." Ghiberti was proclaimed victor, even by his most eminent rivals, Donatello and Brunelleschi. Intrusted, therefore, with this immense labor, he devoted 21 years to its accomplishment, dividing each half of the door into 10 panels, each of which contains a base-relief representing a subject taken from the New Testament. In 1424 this door was placed in one of the side entrances of the baptistery, and its success led to his being commissioned to execute another. This was commenced in 1428, was divided into 10 panels filled with subjects from the Old Testament, occupied him nearly as long as the other, and was superior to it, being declared by Michel Angelo worthy to be the gate of paradise. During the 40 years that he was engaged upon these doors he executed other works in bronze, among which was a statue of Saint John the Baptist, 2 base-reliefs for the cathedral of Sienna, a "Saint Matthew" and "Saint Stephen," and the reliquary of Saint Zanolius surmounted by 6 angels. The last, with the "Saint Matthew," and the second door of San Giovanni, are the masterpieces of modelling in the 15th century, and the door is perhaps still unrivalled. As an architect, Ghiberti was associated with Brunelleschi in constructing the cupola of Santa Maria del Fiore. He excelled in painting upon glass, and in the goldsmith's art. He also left a treatise

on sculpture, a part of which has been published by Cicognara; a treatise on proportions, yet unpublished; and a treatise on Italian art, first published in 1841.

GHKA, HELENA, princess, a Wallachian authoress, better known under the *nom de plume* of Dora d'Istria, born in Bucharest, Jan. 22, 1829. She received a brilliant education, travelled extensively in Europe, translated the *Iliad* into German at the age of 15, and married the Russian prince Koltzoff-Massalski, whom she accompanied to the court of St. Petersburg. She has written largely for a liberal Turin journal, *Il diritto*, and for an Athenian journal, *Le spectateur d'Orient*. Her principal works are: *La vie monastique dans l'église orientale* (Paris and Geneva, 1855; 2d and enlarged ed., Paris, 1858); *La Suisse Allemande et l'ascension du Mönch* (4 vols., 1856; translated, 2 vols., Lond., 1858); *La nationalité Roumaine* (*Revue des deux mondes*, 1858 and 1859). Her latest work is *La Suisse Italienne*. She has also published in Italian *Gli eroi della Rumania* and *I Rumeni ed il papato*.

GHILAN, or JEKLAN, a province of Persia, bounded N. by Russia, N. E. by the Caspian sea, E. by the province of Mazanderan, S. by Irak-Ajemi, and W. by Azerbaijan; pop. estimated at about 800,000 prior to the plague in 1881, by which more than half the inhabitants are said to have perished. It is 170 m. in length, and 50 m. in breadth. The country near the Caspian is for the most part level and swampy, but the interior has lofty mountains crowned with magnificent forests. The climate is moist and unhealthy. The principal productions are silk, rice, and corn. The annual value of silk produce is about \$3,000,000; the fisheries of sturgeon and other fish are extensive, the former in the hands of the Russians. There are few towns, the inhabitants mostly dwelling in single houses, or small hamlets. Capital, Reshd.

GHIRLANDAIO (otherwise called CORRADI, or BICHORDI), DOMENICO DEL, an Italian painter, the master of Michel Angelo, born in Florence in 1451, died there in 1495. His father was a goldsmith, called Ghirlandaio from the silver ornaments in the shape of garlands which he manufactured; and the son, who was brought up to the same calling, inherited the name. Domenico early manifested an extraordinary aptitude for portraiture, and after studying under Alessio Baldovinetti, went to Rome to assist in the decoration of the Sistine chapel. Of the pictures executed by him there but one now exists, the "Calling of St. Peter and St. Andrew." Upon returning to Florence he painted a chapel of the Vespucci family in the church of Ognissanti, in one of the compartments of which he introduced a portrait of the navigator, Amerigo Vespucci. Of greater excellence was his series of frescoes in the Sassetti chapel in S. Trinita representing the life of St. Francis. The picture of the death of the saint is particularly impressive. In these works, as in the frescoes in the choir of Sta. Maria Novella

depicting the lives of John the Baptist and the Virgin, he gratified his love of portrait painting by introducing likenesses of many eminent Florentines of the period; "the portrait," according to Kugler, "in the largest signification of the word, being the prominent characteristic in his productions." He painted many easel pictures in oil and distemper; but his frescoes, in the coloring of which, as well as in the mechanical and technical parts of his art, he excelled all previous painters, are incomparably his finest works. He is said to have created aerial perspective, and to have perfected the art of mosaic. Two brothers and a son of Ghirlandaio were also painters of some distinction.

GHIZEH, GIZKE, GHEEZEH, GEEZEH, or JIZEH, a town of Egypt, capital of a province of the same name, on the W. bank of the Nile, 8 m. S. W. of Cairo. It was once a great and handsome city, but is now a petty village surrounded by heaps of ruins. About 5 m. from the village stand the 3 great pyramids called those of Cheops, Cephren, and Mycerinus. At Ghizeh are egg-ovens, in which eggs have been hatched by artificial means ever since the days of the Pharaohs. (See PYRAMIDS.)

GHUZNEE, or GHIZNEE, also GHAZNA, a fortified city of Afghanistan, on the river Ghuznee, 80 m. S. W. of Cabool; pop. estimated at from 8,000 to 10,000. It is a commercial entrepot between the Punjab and Cabool. In ancient times it was a magnificent city, filled with palaces, mosques, fountains, reservoirs, and baths. Two lofty minarets, the smaller of which is more than 100 feet high, several tombs, and a quantity of ruins scattered over a wide area 3 m. N. E. of the modern town, are the only relics of its former grandeur. In 976 Abustakeen, governor of Khorasan under the king of Bokhara, revolted against his sultan and established at Ghuznee the seat of an independent empire, including Cabool and Candahar. It was under Mahmoud, the 8d prince of this new dynasty, that Ghuznee acquired historical importance as the centre of the first permanent Mussulman conquests in India. Mahmoud extended his victories from the Tigris to the Ganges, from the Indian ocean to the Oxus. He made no fewer than 12 great military expeditions, breaking idols, plundering temples, and rendering his capital one of the richest cities of Asia. He built a mosque of granite and marble, and lavished upon it ornaments of such magnificence that throughout the East it was known as the "celestial bride." He founded and endowed a university; he patronized literature, and filled his court with poets and philosophers. After his death Ghuznee declined. In 1152 it was taken by the prince of Ghore. In 1889 it was stormed by the British under Sir J. Keane. In 1842 it surrendered to the Afghans, but was retaken by Gen. Sir William Nott, who brought back to India the famous gates of Somnauth, which Mahmoud carried off from Guzerat.

GIANNONE, PIETRO, an Italian historian, born in Ischitella, March 7, 1676, died in Turin,

March 7, 1748. He conceived the idea of writing the history of Naples while listening to the distinguished Neapolitans who frequented the house of the juriconsult, Argento. This work was completed in 1723, and treats not only of political events, but also of laws and manners. It was received with great favor by the public, and procured him an office and a pension; but its attacks upon the temporal power of the papacy and its censures of the court of Rome drew upon him the hostility of ecclesiastics. Excommunicated and banished, he retired to Vienna, and thence successively to several of the cities in N. Italy, and lived for a time in Geneva. Being treacherously invited to Turin, he was arrested in 1736, by order of the king of Sardinia, and passed the remainder of his life in prison. His posthumous works were first published at Geneva in 1760.

GIANT (Gr. γίγας, probably from γη and γαω, earth-born), a person of extraordinary size. In Greek mythology, a race of giants dwelt, according to Homer, in the distant west, and were destroyed by the gods for their presumption. Hesiod considered giants divine beings, who sprang from the blood of Uranus as it fell on the earth; and by later poets they were represented as enemies of Jupiter, and as vainly attempting to take Olympus by storm. They were usually placed in volcanic districts, and the legends of their contests with the gods may have originated from volcanic convulsions. The wars waged by the giants and by the Titans, though originally distinct, are often confounded.—In Scandinavian mythology the giants or jotuna are scarcely distinguished from the trolls, though originally the trolls were supposed to be more systematically malignant than the giants, who were rather dull than wicked. They all dwelt in wild pine forests, in caves and clefts of rock, amid heaps of gold and silver and all the treasures of the mineral world. They strode through the dark forest by day, whither no rays of the sun could penetrate, and returned at nightfall to feast and sleep. The sight of the sun was fatal to them, and if they once saw it they burst or were transformed to stone. It is probable that the giants living amid the woods and rocks may be a reminiscence of the gradual suppression and extinction of some hostile race, who, retiring into the natural fastnesses of the land, wandered from forest to forest and from fell to fell, till at last they became mythical. A more ancient tradition was that of the frost giants, personifications of natural powers, who dwelt in Utgard beyond the sea which flowed round the earth in a ring, and who had been dispossessed by Odin and the Asen divinities. There was perpetual feud between the gods of Asgard and the giants of frost and snow, similar to that between the race of men and the trolls.—Giants abound in German legends, and figure with dwarfs, fairies, and magicians in the mediæval romances of chivalry. After the discovery of America stories of gigantic races in the new world were not uncommon,

and the Patagonians especially were said to be 8 and even 12 feet in stature. It is now known that most of the men are 6 feet in height. The women also are unusually tall. Buffon admits 15 authenticated cases of gigantic men. One of these is Hans Bar, 11 feet high, whose likeness, drawn in 1550 of full size, remained in the imperial castle at Innspruck. A Hungarian foot soldier of the archduke Ferdinand is mentioned, who attained the same stature, and his likeness remains in the Ambrosian cabinet at Vienna. Of later giants, one of the best known is Bernhard Gili, who was exhibited in France and Germany in 1764, and whose height, which was stated to be 10 feet, was certainly more than 8 feet. Another example of extraordinary stature was Patrick O'Brien (1761–1806), called the Irish giant, who attained the height of 8 feet 7 inches, and for many years exhibited himself in Great Britain, chiefly in London and at the Bartholomew fairs at Smithfield. His hand, from the commencement of the palm to the extremity of the middle finger, measured 13 inches, and his shoe was 17 inches long. Daniel Lambert (1770–1809) was only 5 feet 11 inches high, but so corpulent that at his death he weighed 789 lbs. Miles Darden of Tennessee (1798–1857) was 7 feet 6 inches high, and weighed at his death over 1,000 lbs. In the anatomical room of Trinity college, Dublin, is preserved the skeleton of a youth named Magrath, born near Cloyne in Ireland. He was 7 feet high in his 16th year, but soon after became imbecile, and died as if of old age in his 20th year. The inhabitants of Potsdam, many of whom are descended from the famous regiment of tall grenadiers formed by Frederic William I., are said to be still remarkable for their superior height.

GIANTS' CAUSEWAY, a series of basaltic rocks in the co. of Antrim, on the N. E. coast of Ireland. For the extent of 8 m., between the promontories of Bengore and Fairhead, the land abuts upon the sea in cliffs of basalt, many of which are made up in great part of rude vertical columns which alternate with layers of amorphous beds of the same class of rock. Ranges of these piled upon each other sometimes reach the height of 400 feet, or at Fairhead even 550 feet. As seen from the sea in front of them, the uniformity of the arrangement of vertical columns and horizontal beds suggests rude resemblances to architectural forms. At the base of the cliffs is a talus of ruins that have fallen from the structures above and slope down to the water. But though the name of Giants' Causeway is often applied to all this coast range, it is properly applicable to but a small portion of it—to a locality quite unpretending in its extent or in the grandeur of its features. It is a platform of basalt, composed of closely arranged columns, the greatest height of which is only about 20 feet. This platform extends from a steep cliff down into the sea, till it is lost below low water mark. Its length exposed at low water is differently given, but probably is less than 600 feet. It is

divided across its breadth into 3 portions, which are called the Little Causeway, the Middle, and the Large or Grand Causeway; the first being the first encountered in approaching from the sea. These are separated from each other by dikes of amorphous basalt. The Great Causeway, which is the principal object of interest, is only from 20 to 30 feet wide, though detached outliers of the same columnar structure standing up on the shore near by might be added to increase the width. They no doubt connect with the same group below the surface. The columns are for the most part hexagonal prisms; but they are found also of 5, 7, 8, and 9 sides, and in one instance at least of 8 sides. They are all jointed into short irregular lengths from a few inches to a few feet each, the articulations being perfectly fitted by a convex end entering the concavity of the adjoining piece, so that the blocks form a true column. There is no uniformity in the arrangement of the convexities and concavities, a block sometimes presenting one or the other, or one of each at each end. The diameter is variable, but ranges generally from 15 to 20 inches. The columns fit together with the utmost precision, the corresponding faces of adjacent prisms being always equal, and so continuing from the top of the platform till the lines of separation are lost beneath the ground. It is said that water even cannot penetrate between adjoining columns. The name causeway is given to the group from the circumstance of the columns terminating at a uniform height, and thus presenting a tolerably smooth area gently inclining to the water. This portion is about 100 yards in length, extending from high water mark to within 20 feet of the cliff. The other portions are more uneven, and the columns in them are not uniformly vertical, but slope outward along the sides. The columns of basalt do not retain their articulated character throughout the cliffs. At Fairhead they rise in single pieces, and, as measured by the officers of the ordnance trigonometrical survey of Ireland, some are found to stand 317 feet in height with sides occasionally of 5 feet in breadth. These are flat at their extremities. The formation is intersected by narrow dikes of columnar basalt, in which the prisms are piled horizontally, ranging across the line of the dikes. (For further facts relating to this formation, see BASALT.) In this region it appears to have been protruded after the period of the deposition of the lias and chalk, the strata of these formations being penetrated by its dikes and overlaid by its horizontal beds. The district affords an excellent opportunity for the study of the changes induced upon the sedimentary rocks by contact with those of igneous origin, of which Buckland and Conybeare availed themselves at an early period. Their observations, containing much new and instructive matter, were published in vol. iv. of the "Geological Transactions."

GIAOUR, a term of insult applied by the Turks to all unbelievers in Mohammedanism, and especially to Christians. The sultan Mah-

moud II. forbade his subjects to apply it to any European Christian. It is equivalent to the English words "heathen," "pagan," or "infidel."

GIBBES, ROBERT WILSON, an American physician and author, born in Charleston, S. C., July 8, 1809. He was graduated at South Carolina college, and having become a physician, removed from Charleston to Columbia, of which city he has twice been mayor. He is now president of the medical association of South Carolina. Among his numerous contributions to medical and scientific publications are articles on "Physio and Physicians" and the "Geology of South Carolina" in the "Southern Quarterly Review," monographs on fossil species in the "Journal of the Academy of Natural Science," and various zoological and palaeontological discussions in the collections of the Smithsonian institution and in the "Proceedings" of the American association for the advancement of science. In his paper on "Typhoid Pneumonia" in the "American Journal of Medical Sciences" (1842), he was the first to advocate the use of stimulants instead of the lancet in the treatment of that malady. He has prepared a "Documentary History of the American Revolution, consisting of Letters and Papers Relating to the Contest for Liberty, chiefly in South Carolina" (3 vols., Columbia and New York, 1853 *et seq.*).

GIBBON, EDWARD, an English historian, born in Putney, Surrey, April 27, 1737, died in London, Jan. 16, 1794. He was the eldest of 7 children, all the rest of whom died in their infancy, and he was so feeble in his youth that many times he seemed likely to share their fate. His aunt, Catharine Porten, took charge of him and watched over him with unceasing care. At the age of seven a domestic tutor, John Kirkby, taught him the elements of Latin. In his 9th year, during "a lucid interval of health," he was sent to the grammar school of Kingston-upon-Thames, where he remained 2 years. His mother having died in 1747, he removed with his father and aunt to Buriton, Hampshire, where he began to read voluminously. In Jan. 1749, Mrs. Porten opened a boarding house for Westminster scholars, and Gibbon enjoyed her care while he attended the school, but, owing to delicate health, learned little. In his 16th year his health improved, a sudden change took place in his constitution, and his mind seemed at the same period to have gained new activity. He now read assiduously, chiefly upon historical subjects; as yet he knew very little Latin or Greek, and preferred translations to the difficult originals. In 1753 he went to Oxford, and arrived "with a stock of erudition which might have puzzled a doctor, and a degree of ignorance of which a school boy might have been ashamed." Neglected by his tutor, he gave himself to general reading. He was then fond of oriental research, and bought the *Bibliothèque orientale* of D'Herbelot with his spare money. He began his history of the "Age of Sesostris," which he at first hoped to print, but finally burned. He was also busy with religious controversy, and having read



Bossuet's "Variations of Protestantism" and "Exposition of Catholic Doctrine," as well as other controversial writings, became a Roman Catholic, and resolved to proclaim his conversion openly. He went from Oxford to London, and there, before a Catholic priest, abjured Protestantism, and was reconciled to the church. Next he wrote a long controversial letter to his father, informing him of his conversion. The father revealed the secret, and Gibbon was expelled from Oxford, after a residence there of 14 months. He was now consigned to Switzerland in a kind of exile, and placed under the care of M. Pavillard, a Calvinistic minister at Lausanne, who it was hoped would reconvert him. He lived in a plain manner in M. Pavillard's house, and at first lamented the loss of English luxury. But soon his passion for study revived; he read systematically the Latin, Greek, and French classics, Crousz, Locke, and Grotius, and was especially delighted with the "Provincial Letters" of Pascal, from which he learned "to manage the weapon of grave and temperate irony, even on subjects of ecclesiastical solemnity." During the 5 years of his exile he made the French language more familiar to him than the English. He returned to Protestantism on Christmas, 1754, 18 months after his conversion to Catholicism, and from that time he cared little for theological distinctions. At Lausanne he formed an attachment for an accomplished Swiss young lady, Mlle. Susanne Curchod. His father, however, disapproved of the connection, and Gibbon philosophically resigned the object of his love, who afterward became the wife of the banker Necker. "I sighed," he says, "as a lover, but obeyed as a son." It is not a little remarkable that they remained ever after friends. In the summer of 1758 his father permitted him to return to England. He was received by his stepmother with a kindness which he was glad to return, and passed 2 years chiefly in study at the family seat, Buriton, and accomplished a course of classical reading equalled by few of his contemporaries. On a visit of several months to London he passed most of his time as a literary recluse, but became intimate with David Mallet, by whose counsel he made an assiduous study of the most esteemed English authors, as Addison, Swift, Robertson, and Hume. He next joined with his father the Hampshire militia, and for 2½ years studied practically the military art. Even in the camp he found time for books, and meditated a number of great literary projects, among which was a history of the crusade of Richard Cœur de Lion, of the wars of the barons, of the expedition of Charles VIII. into Italy, and lives of Edward the Black Prince, Sir Philip Sidney, and Sir Walter Raleigh. In 1761 he published a brief work, his *Essai sur l'étude de la littérature*, which he had commenced at Lausanne, designed to defend classical studies against the attacks of the French philosophers. The essay was written in French, and was commended by foreign critics, though scarcely no-

ticed in England. He travelled in 1763, and on his way to Lausanne spent 8 months at Paris. His essay had given him some renown, and he frequently met D'Alembert, Diderot, Baron d'Holbach, and the other philosophers, with whose society he was so much pleased that he says: "Had I been rich and independent I should have prolonged, and perhaps have fixed my abode at Paris." After remaining at Lausanne nearly a year, he passed in 1764 into Italy. As he approached Rome, he occupied his mind with its antiquities and topography. He read Nardini, Donati, Cluverius; he filled his commonplace books with copious extracts, and stored his memory with abundant learning before he ventured to cross the forum or ascend the Capitoline hill. With emotions almost uncontrollable he entered the sacred city, and a sleepless night preceded his first walks to survey its relics of classical antiquity. In them he found a theme worthy of his literary ambition and historic genius. "It was at Rome," he writes, "on the 15th of Oct. 1764, as I sat musing amid the ruins of the capitol, while barefooted friars were singing vespers in the temple of Jupiter, that the idea of writing the decline and fall of the city first started to my mind. But my original plan was circumscribed to the decay of the city, rather than of the empire; and though my reading and reflections began to point toward that object, some years elapsed, and several avocations intervened, before I was seriously engaged in the execution of that laborious task." He went south to Naples, returned to Paris, and reached his father's house in June, 1765. At Lausanne in his earlier visits he had formed an intimacy with M. Deyverdun, a young Swiss of fine scholarship, who now visited him yearly at Buriton. With his aid Gibbon began writing a history of the liberty of the Swiss. After two years of study and preparation, he submitted the first book, which was written in French, to a literary club of foreigners in London, by whom it was at once condemned, and the work went no further. He next, in connection with Deyverdun, started the *Mémoires littéraires de la Grande Bretagne*. It was designed to be annual, but 2 volumes only were printed (1767-'8), when Deyverdun went abroad. His next work was an anonymous and acrimonious attack on that portion of Warburton's "Divine Legation of Moses," in which he supposes the 6th book of the *Æneid* to contain an allegorical account of the initiation of *Æneas* in the character of a lawgiver into the Eleusinian mysteries. Though Warburton was the ruling critic of the time, Gibbon's "Critical Observations" (1770) were admitted to have overthrown his hypothesis. The subject was one that could have little general interest, but the unknown author was mentioned by Heyne of Göttingen as a *doctus et elegantissimus Britannus*. His father having died in Nov. 1770, Gibbon settled in London, and with a considerable, though somewhat embarrassed estate, lived in studious ease, and began to

labor more directly upon his "Decline and Fall," which he had been wont to "contemplate at awful distance." His library was extensive, and had been selected with care; his materials were around him, and he wrote with method. With pen in hand he plunged into "the ocean of the Augustan history," pored over all the remains, Greek and Latin, between Trajan and the last of the western Cæsars, studied medals and inscriptions, the Theodosian code, the Christian apologists, the collections of Tillemont, the annals and antiquities of Muratori, and brooded long over his chaos of materials before he was able to determine the limits, divisions, or even the title of his work. He practised on his style, cultivated his ear for harmony, and finally by labor acquired his elevated and sonorous mannerism. The 1st chapter of the history he rewrote 3 times before he was satisfied with it, and the 2d and 3d chapters twice, after which he proceeded with facility. In 1774 he entered the house of commons as member for the borough of Liskeard, in which he sat for 8 years a silent supporter of the measures of Lord North. Such was his timidity that he was never able to address the house; more than once he prepared himself to speak, but when the moment for action came his courage wholly deserted him. Near the close of 1775 the first volume of his history was completed. It was refused by the bookseller Elmsly, but accepted by Oadell and Strahan. It appeared in Feb. 1776; its success was immediate, and, for a quarto and grave historical production, unprecedented. The 1st edition was exhausted in a few days; a 2d and 3d were soon called for. Hume and Robertson, to whom he sent copies, wrote him congratulatory letters. His splendid theme and imposing style fixed the attention of the public, while his malevolent views of Christianity in the last two chapters called forth a host of replies. Watson, Taylor, Milner, Lord Hales, Davies of Oxford, and Dr. Priestley were the most noted of his assailants; but to Mr. Davies alone would the historian consent to reply, because this critic had questioned not his faith, but his historical fidelity. His "Vindication" soon appeared, in which he freed himself from the charge of misquotation. Meantime he studied chemistry and anatomy for recreation. He wrote a political pamphlet in French, in defence of the ministry, and was rewarded with a sinecure place in the board of trade worth £800 a year. He was a member of the literary club, and a noted conversationalist. The 2d and 3d volumes of his history were published in 1781, and were received with avidity, though less clamorously than the 1st. On the fall of Lord North's ministry and the loss of his salary by the abolition of the board of trade, Gibbon thought himself too poor to live in England, and determined to fix his abode at Lausanne, whither he repaired in 1783 to reside with his friend Deyverdun. His 4th volume, embracing the reign of Justinian and the chapter on the Institutes, was already finished, but on the borders of the lake of Geneva he allowed

nearly a year to pass before he vigorously resumed his work. He was fond of society, and became highly popular among the Swiss; he gave balls and suppers, frequented assemblies, and even after he was fairly reseated at his task mingled gayety with constant study. Eminent visitors, as Prince Henry of Prussia, M. and Mme. Necker, Mr. Fox, and the duchess of Devonshire, discovered and enlivened his Swiss retreat. He wrote steadily and rapidly till he completed his work. "It was on the day, or rather night, of the 27th of June, 1787, between the hours of 11 and 12, that I wrote the last lines of the last page in a summer house in my garden. . . . The air was temperate, the sky was serene, the silver orb of the moon was reflected from the waters, and all nature was silent. I will not dissemble the first emotions of joy on the recovery of my freedom, and perhaps the establishment of my fame. But my pride was soon humbled, and a sober melancholy was spread over my mind by the idea that I had taken an everlasting leave of an old and agreeable companion; and that whatsoever might be the future date of my history, the life of the historian must be short and precarious." He went over to England bearing the manuscript of the last 3 volumes with him, and on his 51st birthday, the period selected by himself, they were issued. The work was already established in fame; it was translated into German, French, and Italian. His profit from all the volumes is stated to have been £6,000, and that of the booksellers £80,000; but on this subject nothing is known. The latter volumes were reproached for indecencies, veiled for the most part in the learned languages in the notes. Gibbon returned to Lausanne in July, 1788, to find his friend Deyverdun dying. He hired the house which they had occupied together, and invited the family of the Severys to live with him, consisting of a father, mother, son, and daughter. They presided over his house and amused his leisure. At this time he wrote his own "Memoirs," which were published posthumously. The French revolution disturbed his repose. Lausanne was filled with French emigrants; the Neckers with their daughter, afterward Mme. De Staël, were his neighbors at Coppet. Lady Sheffield, the wife of his intimate friend Lord Sheffield, died about this time, and Gibbon, partly in the hope of consoling his friend, partly in fear of the revolution, set out for England in the spring of 1798. He had long suffered from hydrocele, which he had studiously concealed, and he died calmly after undergoing 8 painful operations in vain. He was buried in Lord Sheffield's family burial place at Fletching, in Sussex, and his epitaph was written by Dr. Parr.—In appearance Gibbon was heavy and dull, his countenance showed no trace of intellect, and his features were unattractive. He was fond of fine dress, and his manners were well bred but pompous. He conversed with fluency in sounding language and well ordered periods. Few generous or elevated acts are told of him. His

"Decline and Fall of the Roman Empire" is admitted to be the greatest historical work in the English language, and one of the greatest creations of any single intellect. It is hardly less than the history of the world for nearly 18 centuries, for it comprises an account of all the nations who influenced the destinies of the Roman empire both in the West and East. Its vast design, including the decay and ruin of an ancient civilization and the birth and formation of a new order of things; its lucid arrangement, subordinating an infinite variety of subjects to one main and predominant idea, tracing the progress of hostile religions, the influx of successive hosts of barbarians from remote and opposite quarters, the development of the Roman law, the details of ecclesiastical history, and the gradual rise of modern states, according to the impressions which they made on the tottering fabric of Roman greatness; its singular condensation of matter, general accuracy, and monotonously splendid, imposing, and picturesque style, are among the qualities which secure its eminence in historical literature. "Christianity alone," says Milman, "receives no embellishment from the magic of Gibbon's language; his imagination is dead to its moral dignity; it is kept down by a general tone of jealous disparagement, or neutralized by a painfully elaborate exposition of its darker and degenerate periods."—The best editions are those edited by the Rev. H. H. Milman, with notes, (12 vols., London, 1838-'9; 2d ed., 6 vols., 1846; New York and Boston, 1856), and by an English churchman, with variorum notes, in Bohn's "British Classics" (7 vols., London, 1853-'5); also, best of all, that in Murray's "British Classics," with additional notes by Dr. William Smith (8 vols., London, 1854-'5). Gibbon's memoirs and miscellaneous writings were published under the care of Lord Sheffield (2 vols., London, 1796, to which a 3d volume was added in 1815).

GIBBS, GEORGE, an American mineralogist, born in Newport, R. I., Jan. 8, 1782, died in Newtown, N. Y., Aug. 5, 1838. Early becoming interested in the study of mineralogy, he collected during his travels in Europe, chiefly by purchase, a very extensive and valuable cabinet of minerals, in some respects the richest ever brought together in the United States. This collection he brought home in 1807, and set it up in the public rooms of Yale college, where it remained without charge from 1811 to 1825. In the latter year it was purchased for the college for \$20,000.

GIBBS, JOSHUA WILLARD, an American philologist, born in Salem, Mass., April 30, 1790, was graduated at Yale college in 1809, and was tutor in that institution from 1811 to 1815. In 1824 he was appointed professor of sacred literature in the theological department of Yale college, and he still continues in this station. In 1853 the degree of LL.D. was conferred on him by the college of New Jersey. In his special department, and in philological and gram-

matical studies generally, he is well known as a scholar of uncommon thoroughness and accuracy. His principal publications are, a translation of Storr's "Essay on the Historical Sense of the New Testament" (12mo., Boston, 1817); translation of Gesenius's "Hebrew Lexicon of the Old Testament" (8vo., Andover, 1824); "Manual Hebrew and English Lexicon," abridged from Gesenius (8vo., Andover, 1828; 2d ed., New Haven, 1832); "Philological Studies" (12mo., New Haven, 1837); "Latin Analysts" (New Haven, 1838). He is the author of several sections of Prof. W. O. Fowler's work on the English language, and has contributed to the periodical works of his time numerous important papers on topics of philology and criticism.

GIBEON, one of the principal cities of Palestine, about 5 m. N. W. from Jerusalem. Before the conquest of Canaan by Joshua, it was inhabited by Hivites, who by stratagem secured their own safety and protection from Israel; though when the deception was discovered the Gibeonites were degraded to the condition of hereditary "hewers of wood and drawers of water unto all the congregation." It is not mentioned as one of the royal cities of the Canaanites, though described as "a great city, and as one of the royal cities." When the 5 kings of the Amorites besieged Gibeon because of its having made peace with Israel, Joshua marched against them, and at his command "the sun stood still, and the moon stayed, until the people had avenged themselves upon their enemies" (Josh. x. 1-14). The Gibeonites were persecuted and nearly exterminated by Saul. On the division of Canaan, Gibeon fell to the tribe of Benjamin; afterward it was given to the Levites; toward the close of David's and in the beginning of Solomon's reign, the sanctuary was there, and there dwelt the high priest. Near to it was a pool, probably the "great waters" referred to by Jeremiah, where Abner was defeated by Joab, and also a great stone, or monumental pillar. It is identified with the modern El Jib, an irregular village, seated on the summit of a hill, and containing massive ruins.

GIBRALTAR (anc. *Mons Calpe*), a fortified promontory of Andalusia, Spain, belonging to Great Britain, and giving name to a town and bay on its W. side, and to the strait connecting the Atlantic and Mediterranean; lat. of Europa point, its S. extremity, 36° 2' 30" N., long. 5° 15' 12" W. This promontory and Ceuta (anc. *Mons Abyla*), on the opposite coast of Africa, constitute the ancient pillars of Hercules, long regarded as the western boundary of the world. It consists of rock, principally a gray compact marble, 8 m. long from N. to S. and but 7 m. in circumference, about 1,600 feet above the level of the sea at its highest point, and connected with the mainland by a narrow sandy isthmus, called the neutral ground, about 1½ m. long. The N., E., and S. sides are so steep and precipitous as to be almost wholly inaccessible; the W. side, toward the bay, slopes down to

the water, and here are situated the town and the principal fortifications. The rock is perforated by a number of remarkable caverns, in which many bones of animals and of men have been found. There is little soil, but acacia, fig, and orange trees, and a variety of plants, grow in some sheltered glens. Among the few native animals are the only wild monkeys found in Europe, a peculiar tailless species, which are protected from destruction by public sentiment, being regarded as almost sacred. Immense sums have been expended upon the fortification of this rock, which nature and art combined would appear to have rendered literally impregnable. The most remarkable works are the galleries—two passages cut through the solid rock, between 2 and 8 m. long, wide enough to admit a carriage, and pierced with port holes at every 12 yards in such a manner as to command the bay and the neutral ground. About 1,000 guns altogether are mounted upon the rock. In 711 a body of Moors took possession of this promontory, and named it from their leader Gebel el Tarik (Tarik's mountain), whence the present name. Of the fortifications erected by them, a tower still remains. They held it till 1809, and again from 1833 to 1463, when they were finally expelled by the Spaniards. The latter greatly strengthened it, and regarded it as impregnable; but it was taken by a combined English and Dutch fleet in 1704, and was confirmed to Great Britain by the treaty of Utrecht in 1718. In Feb. 1727, the Spaniards attacked it with a large force, but raised the siege on the signing of preliminaries of a peace with Great Britain in May of the same year. In 1779 the attempt was renewed with the aid of a French squadron. By June 21 all communication between the rock and the mainland was cut off, and in July the fortress was completely blockaded. The cannonading began in September on the part of the besieged, but the Spaniards did not open their fire until Jan. 1780. The attack and defence which now followed fixed the attention of the whole of Europe for the next 3 years. On the part of the besiegers all the resources of war were brought to bear both by land and sea. The best engineers of France and Spain directed the approaches; a powerful fleet anchored in the bay, and for 3 weeks an incessant bombardment was kept up from 80 mortars and 200 pieces of battering cannon. The garrison, commanded by Gen. Eliott (afterward Lord Heathfield), and numbering 7,000 men, made a heroic resistance. On Nov. 27, 1781, they destroyed the enemies' works in a sortie, but the allies at once reconstructed them, and soon brought 1,000 pieces of artillery to play against the fortress, while 47 ships of the line and innumerable smaller vessels menaced it by sea, and an army of 40,000 men conducted the operations on land. The whole enterprise was directed by the duke de Crillon. Meanwhile Admiral Rodney, having defeated the fleet of Count de Grasse, succeeded in throwing relief

into the fort, and the British were still further encouraged by the effect of the red-hot shot which they discharged against the batteries and shipping. In Sept. 1782, the allies attempted to silence the British fire by means of 10 enormous floating batteries constructed under the chevalier d'Arcon in such a manner as to be deemed invulnerable. Each was manned by a picked crew and mounted from 10 to 18 guns. On the 13th they were put in motion, and at about 10 in the morning one of the most dreadful cannonadings known in history was opened on both sides. It continued for several hours with little advantage to either party, but late in the afternoon the effect of the red-hot shot from the garrison became apparent, and soon after midnight 9 of the batteries were on fire. Of their crews about 400 men were saved by the exertions of the British; the rest perished by the flames, explosions, or drowning. The besieged had 16 killed and 68 wounded. Several attempts to storm the rock by land proved equally disastrous; the British received fresh reinforcements, and in Feb. 1783, the siege was raised on the announcement of the general peace. —The town of Gibraltar is built near the foot of the N. W. side of the hill, with paved and lighted streets and houses in the English style; pop. in 1854, 15,823. Its principal edifices are the residences of the governor and lieutenant-governor, the admiralty, barracks, storehouses, cathedral, Spanish church, synagogue, naval hospital, lunatic asylum, and almshouses. It contains a public library with 15,000 volumes, a medical library, and one founded by the merchants. Great pains are taken to prevent the increase of new residents, and foreigners are allowed to remain only during specified periods and on giving security for good behavior. The trade has declined since the commencement of the 19th century. The exports to Great Britain comprise wool, tobacco, wine, silk, and senna, and the imports consist chiefly of wine, spirits, tobacco, spices, tea, and cotton. Vessels entered in 1854, 8,678, tonnage 589,560; vessels cleared, 3,598, tonnage 581,463. The revenue in 1855 amounted to £30,899, and the expenditures to £29,830. —The bay of Gibraltar, or Algeciras bay, lying between Cabarita and Europa points, is 5 m. in greatest width from E. to W. and 8 m. long, deep, convenient, and well sheltered. It has 2 moles respectively 700 and 1,100 feet long. —The strait, anciently called the straits of Hercules, or of Gades (*Fretum Gaditanum*), extends about 86 m. nearly E. and W., its width at the E. extremity, between Europa point in Spain and Ceuta point in Africa, being about 15 m., and at the W., between Capes Trafalgar on the Spanish and Spartel on the African coast, 24 m. Its narrowest point is about the middle, where the opposite coasts are but 9 m. apart. There is a constant current through this channel from the Atlantic into the Mediterranean, and two counter-currents, of inferior breadth and rapidity, flow westward, one along each coast.

GIBSON. L. A. W. co. of Tenn.; area, 520 sq.

m.; pop. in 1850, 19,548, of whom 4,194 were slaves. The surface is generally even and the soil fertile. The productions in 1850 were 1,107,780 bushels of Indian corn, 93,784 of oats, 4,918 bales of cotton, and 466,390 lbs. of tobacco. There were 17 corn and flour mills, 10 saw mills, 5 tanneries, 1 newspaper office, 43 churches, and 1,150 pupils attending public schools. The Mobile and Ohio railroad, and the projected route of the Memphis and Ohio railroad, pass through the county. Capital, Trenton. IL A S. W. co. of Ind., bordering on Illinois; area, 449 sq. m.; pop. in 1850, 10,771. It has an undulating surface and a rich soil, watered by the Wabash and Patoka rivers, the former of which forms the W. boundary of the county. The productions in 1850 were 947,590 bushels of Indian corn, 43,888 of wheat, 77,686 of oats, and 1,693 tons of hay. There were 15 corn and flour mills, 4 saw mills, 8 tanneries, 2 newspaper offices, 19 churches, and 2,060 pupils attending public schools. Live stock and coal are among the most valuable exports. The Wabash and Erie canal and the Evansville and Crawfordsville railroad intersect the county. Capital, Princeton.

GIBSON, JOHN, an English sculptor, born at Conway, North Wales, in 1791. His father soon after removed to Liverpool, and young Gibson, after endeavoring to prevail on his parents to allow him to study painting, for which he had shown a predilection, was articulated at the age of 14 as a cabinet maker, and soon after to a wood carver. In this employment he remained until a visit to the marble yard of the Messrs. Francis filled him with the desire of becoming a sculptor. These gentlemen, upon hearing of the circumstance, purchased his indentures and took him into their employment. As his talent began to develop itself he attracted the notice, among others, of William Roscoe, who invited him to his house, lent him prints and models, and encouraged him to pursue the career of a sculptor. A fund was soon raised in Liverpool to enable him to prosecute his studies in Italy, and in 1817 he departed for Rome, where he has since resided. Lord Brougham and others had given him letters to Canova, and that eminent sculptor, after examining Gibson's sketches, not only received him into his studio, but offered him pecuniary assistance, and recommended him to some of the wealthiest patrons of art. On the death of Canova he placed himself under Thorwaldsen, thus enjoying within the space of a few years the society and tuition of the two most famous sculptors of the century, whose distinctive qualities he has very happily united in his own works. It was not until 1827 that Gibson sent his first contribution to the exhibition of the royal academy, "Psyche borne by the Zephyrs," executed for Sir George Beaumont. Several other works followed, and in 1836 he was elected a full member of the academy, having for some years previous been an associate. The works which have left Gibson's studio

during his long career are principally portrait statues, and ideal pieces founded on classic models. Of the former, the best known are his statues of Queen Victoria in Buckingham palace, Osborne, and the new palace at Westminster, the 8 of Huskisson in Liverpool, and those of Sir Robert Peel and George Stephenson. They are all works of an impressive character, and would be nearly perfect if the artist had not adhered to the now nearly obsolete practice of habiting his figures in classic costume, whereby it has been said his British statesmen look like Roman senators with English faces. His ideal figures and bass-reliefs are imbued with the spirit of Greek art, for which the sculptor has always professed the profoundest reverence. Refinement of feeling, high poetical imagination, exceeding gracefulness of form and expression, and an almost unrivalled delicacy of execution, characterize this class of his sculptures, of which the "Mars and Cupid" and "Hero and Leander," in the possession of the duke of Devonshire, the "Aurora," "Sappho," "Hebe," "Proserpine," "Sleeping Shepherd," and the "Venus," for St. George's hall in Liverpool, are favorable examples. Gibson is the first of modern sculptors who has had the daring to introduce color into his works. In some of the subordinate details the statue of the queen and the "Aurora" were slightly tinted, but the Venus above mentioned showed the innovation carried to its furthest limit. This statue, which was exhibited in 1854, in a room prepared for the special purpose, is entirely colored of a flesh tint, and the eyes, hair, and parts of the drapery counterfeited the resemblance to actual life as nearly as color can do it. The practice has encountered much hostile criticism, but the sculptor defends it by a reference to Greek precedents. Gibson has seldom visited England, and only for brief periods, the first time being after an absence of 28 years. At Rome, he is a kind and genial adviser of young art students, and beloved by all classes. Among his most recent pupils was Miss Hosmer, the American sculptress.

GIBSON, JOHN BANNISTER, LL.D., an American jurist, born in Shearman's Valley, Penn., Nov. 8, 1780, died in Philadelphia, May 3, 1853. He was a son of Lieut-Col. George Gibson, an officer of the revolutionary army, who fell in St. Clair's expedition against the Indians on the Miami in 1791. He studied at Dickinson college, and previously at the grammar school of that institution, read law under Thomas Duncan, Esq., afterward judge of the supreme court of Pennsylvania, was admitted to the bar of Cumberland co. in 1803, practised successively in Carlisle and Beaver, Penn., and in Hagerstown, Md., returned to Carlisle, was elected by the republican party in 1810 and again in 1811 to the state legislature, in which he filled a prominent station, and in July, 1813, was appointed presiding judge of the 11th judicial district of Pennsylvania. In 1816 he was made associate justice of the supreme court of the

state, and on the death of Judge Tilghman in 1827 he became chief justice. He resigned this position in 1833, but was immediately reappointed to it by the governor. By a change in the constitution, making the judiciary elective, his seat became vacant in 1851, but he was elected associate justice in the same year, being the only one of the former incumbents who received the nomination of the democratic party. He continued to discharge the functions of this office until attacked by his last illness.

GIBSON, THOMAS MILNER, an English statesman, born in 1807. He is the son of Major Gibson, was graduated at Cambridge in 1830, and was a member of parliament for Ipswich and a follower of Sir Robert Peel from 1837 to 1839, when he engaged in the agitation against the corn laws. He thereupon resigned his seat, and remained out of parliament until 1841, when after a violent contest he was elected member for Manchester, and after the passage of the free trade measures in 1846 he became a member of the privy council and vice-president of the board of trade, but resigned that office in 1848. The act to amend the laws relating to the stamp duties on newspapers was passed chiefly through his exertions (June 15, 1855), and he was one of the principal supporters of the law admitting Jews into parliament, which was eventually passed July 23, 1858. He is also a zealous champion of a national system of education. As a member of the peace party he opposed, in concert with his colleague and friend John Bright, the Russian war, which cost him his seat for Manchester at the general election of 1857. In May, 1859, he was reelected as a member for Ashton; and the presidency of the board of trade having been offered to Mr. Richard Cobden by Lord Palmerston, but declined by that gentleman, Mr. Gibson accepted that office.

GIDDINGS, JOSHUA REED, an American statesman, born at Athens, Bradford co., Penn., Oct. 6, 1795. In his infancy his parents removed to Canandaigua, N. Y., where they remained till he was 10 years old, when they emigrated to Ashtabula co., Ohio, among the first settlers in that part of the Western Reserve. In Ohio he had only such facilities for study as he could command in the family circle, in the intervals of hard labor upon his father's farm. In 1812, when less than 17 years old, he enlisted as a soldier for active service, being accepted as a substitute for an older brother. He was one of the expedition sent to the peninsula north of Sandusky bay, where, in two battles on one day with a superior force of Indians, it lost nearly  $\frac{1}{2}$  of its number in killed and wounded. At the close of his short term of service as a soldier he commenced school teaching. In 1817 he commenced the study of the law with the Hon. Elisha Whittlesey, and was admitted to the bar in 1820. In 1826 he was chosen a representative to the state legislature, and after serving one term, declined a reelection, and devoted himself to his profession till 1838,

when he was elected to congress as the successor of Mr. Whittlesey. Having been for some years an active abolitionist, and entering congress at a time of great excitement on the subject of slavery, he not only took his stand by the side of John Quincy Adams as a supporter of the right of petition, but became at once a prominent champion of the abolition of slavery and the slave trade in the district of Columbia and the territories under the jurisdiction of the national government. Attentive to all the ordinary duties of legislation, and a frequent participator in discussions respecting the tariff and other current political topics, he yet became distinguished chiefly by the zeal and pertinacity of his opposition to slavery. His first attempt to speak against the slave trade in the district of Columbia was made Feb. 11, 1839, when he was silenced by the enforcement of a rule enacted for the purpose of preventing the discussion of that and kindred topics. On Feb. 9, 1841, he delivered his first anti-slavery speech, upon the Indian war in Florida, which he contended was begun and carried on in the interest of slavery. In the autumn of 1841 the Creole, an American vessel, sailed from Virginia for New Orleans, with a cargo of 136 slaves. The slaves rose upon the master and crew, and, after a brief struggle, in which they killed one man, took possession of the vessel and entered the British port of Nassau, where their right to freedom was recognized and protected. This event created an intense excitement in the United States, and Mr. Webster, then secretary of state, in a letter addressed to Mr. Edward Everett, U. S. minister at London, avowed the intention of the government, in the interest of the owners, to demand indemnification for the slaves. On March 21, 1842, Mr. Giddings brought the subject before congress in a series of resolutions, in which it was declared that, as slavery was an abridgment of natural right, it could have no force beyond the territorial jurisdiction that created it; that when a ship left the waters of any state, the persons on board ceased to be subject to the slave laws of such state, and thenceforth came under the jurisdiction of the United States, which had no constitutional authority to hold slaves; that the persons on board the Creole, in resuming their natural rights of personal liberty, violated no law of the United States, incurred no legal penalty, and were justly liable to no punishment; and that any attempt to reenslave them was unauthorized by the constitution and incompatible with the national honor. These resolutions created an excitement so intense that Mr. Giddings, yielding to the importunities of some of his party friends, who thought the time unfavorable for their consideration, withdrew them, declaring his intention to present them on a future occasion. Mr. Botts of Virginia thereupon introduced a resolution, declaring the conduct of Mr. Giddings, in offering the resolutions, to be "altogether unwarranted and unwarrantable, and deserving the severe condemnation of the

people of this country, and of this body in particular." The previous question being moved, Mr. Giddings was denied the right of self-defence, and the resolution was adopted by 125 yeas to 69 nays. Mr. Giddings instantly resigned his seat and called upon his constituents to pronounce their judgment in the case, which they did in reflecting him by a large majority. He resumed his seat on May 5, after an absence of 6 weeks, and held the post by successive re-elections till March 4, 1859—making his whole period of service 21 years. He was one of the 19 members of congress who, in 1843, united with Mr. Adams in an address to the people of the United States, warning them against the annexation of Texas, and declaring that its consummation "by any act or proceeding of the federal government, or any of its departments, would be identical with dissolution." In 1844 he united with Mr. Adams in submitting a report (upon a memorial from the legislature of Massachusetts), in which it was distinctly declared that the liberties of the people had their primary foundation in the truths of Christianity. In 1849 he made an elaborate speech, in which he maintained that man could not be property, and that to treat him as such is a crime. In the same year, the senate having amended an appropriation bill by inserting a provision extending the laws of the coasting trade to California, with the intention, as was believed, to legalize the trade in slaves between the Atlantic and Pacific coasts, Mr. Giddings, on the last night of the session, called attention to the matter, and succeeded in getting the provision removed. In the Oregon controversy, he maintained the right of the United States to the whole territory, declaring that that right would be sacrificed by the administration for fear that a war with Great Britain would lead to the abolition of slavery. In the celebrated case of the *Amistad*, he maintained the right of the negroes to take their freedom, and zealously opposed the effort to induce congress to indemnify the Spanish claimants. In 1847 he refused to vote for the Hon. Robert O. Winthrop, the whig candidate for speaker, deeming him unsound on the slavery question. He acted generally with the whig party till 1848, giving his hearty support to Gen. Harrison and Henry Clay, but refused, on anti-slavery grounds, to support Gen. Taylor. In the election of 1848 he acted with the free soil party. In 1849 he united with 8 other members of the house in refusing to vote for any candidate who would not pledge himself to such a construction of the standing committees as would secure a respectful consideration of petitions relating to slavery; in consequence of which the whig candidate for speaker, the Hon. Robert O. Winthrop, after a struggle of 3 weeks, failed of his election, the Hon. Howell Cobb, the democratic candidate, being chosen by a plurality of votes. In 1850 he took a prominent part in opposing the enactment of the "compromise measures," so called, especially the fugitive slave law. He was conspicuous also in the de-

bates upon the repeal of the Missouri compromise, and in those upon the subsequent troubles in Kansas. In July, 1850, Mr. Giddings was distinctly charged with abstracting important papers from the general post office. He brought the matter before the house, and demanded an investigation. A committee, composed chiefly of his political opponents, after a rigid examination, exonerated him entirely, it being conclusively shown that the charge was the result of a conspiracy against him. On May 8, 1856, while addressing the house, he suddenly fell to the floor in a state of unconsciousness, from which, however, he soon revived, though in a condition of great weakness. On Jan. 17, 1858, he fell again in the same way, and for some minutes was supposed to be dead. He slowly returned to consciousness, but was compelled for a time to be absent from his post. His disease was an affection of the nervous system operating upon the heart. In 1843 Mr. Giddings wrote a series of political essays, signed "Pacifious," which attracted considerable attention. A volume of his speeches in congress has been published (12mo., Boston, 1858); and in 1858 appeared "The Exiles of Florida," compiled by him and published at Columbus, O.

GIDDINGS, SALMON, a pioneer missionary in Missouri and Illinois, born in Hartland, Conn., March 2, 1782, died in St. Louis, Mo., Feb. 1, 1828. He was graduated at Williams college in 1811, pursued his theological studies at Andover, was ordained to the ministry in 1814, and after being for one year tutor in Williams college and preaching for a short time as an itinerant, determined to go as a missionary to the "western country." He set out on horseback in Dec. 1815, under the direction of the Connecticut missionary society, preached often on his journey, reached St. Louis April 6, 1816, and spent a year and a half in itinerating through the country, visiting most of the towns and settlements on both sides of the Mississippi. On Aug. 2, 1816, he organized the first Presbyterian church in that region, at Bellevue settlement, 80 m. S. W. of St. Louis; and in Nov. 1817, the first in the latter place. Within 10 years he had organized 11 churches, 5 in Missouri and 6 in Illinois. In 1822 he made a long tour among the Indian tribes within the present territories of Kansas and Nebraska, visiting the Osages, Kansas, Omahas, Pawnees, and Ottos, holding councils with their chiefs and principal men, and selecting sites for mission stations and schools. He preached half of the time to the St. Louis church during the first 4 years after its organization, and then more regularly, till in 1826 he was installed its pastor by the presbytery of Missouri, which then included also Illinois. Its first church edifice was erected in 1828-'4. He was remarkable for steadiness of character, soundness of judgment, and fidelity in all offices of kindness and mercy; and the trustees of his church, as a token of their affectionate respect, had his remains deposited in a

vault beneath the pulpit. Only one of his sermons was published; it is entitled "The Gospel the Power of God unto Salvation," was printed at St. Louis, and was the first sermon ever printed west of the Mississippi.

**GIDEON**, surnamed **JERUBBAAL**, the 5th judge in Israel, was the son of Joash, of the tribe of Manasseh, and dwelt at Ophra. His history is narrated in Judges, vi. to ix. Israel had been for 7 years humbled by the Midianites and Amalekites, when the Lord by a double miracle called Gideon to be their deliverer. Having fulfilled his mission, the Israelites solicited him to become their king, but he declined the position.

**GIESSELER**, **JOHANN KARL LUDWIG**, a German church historian, born in Petershagen, March 3, 1792, died in Göttingen, July 8, 1854. He interrupted his studies in the university of Halle to serve as a volunteer in the campaign of 1813. In 1815 he resumed his studies, which he combined with teaching, and in 1819 was appointed professor of theology in the university of Bonn, which he exchanged in 1831 for the corresponding professorship at Göttingen. His principal work is a history of the church. The 5 volumes published during his lifetime brought the history down only to the peace of Westphalia in 1648; but from the notes and manuscripts which he left, it was continued to the present century by his pupil Redepenning. An American edition of the entire work was published in 1857-'8 under the editorial care of Prof. Henry B. Smith, from the English translation of Davidson. A translation into English was previously made in this country by Francis Cunningham (Philadelphia, 1842).

**GIESSEN**, capital of the German province of Upper Hesse, and of a circle of its own name in the grand duchy of Hesse-Darmstadt, situated at the confluence of the Wieseck with the Lahn, 41½ m. by rail from Frankfort, and 88½ m. from Cassel; pop. about 9,000. It is well though irregularly built, and contains an old castle, a hospital, arsenal, university, and 2 churches. The university, which was founded in 1607, had in 1858, 45 teachers and 380 students, a library of 34,000 volumes, an observatory, botanical garden, and museum. Its school of organic chemistry under Liebig has recently been especially distinguished. It had a larger number of professors and students prior to the withdrawal of the Roman Catholic faculty to Mentz in 1851.

**GIFFORD**, **WILLIAM**, an English author, born in Ashburton, Devonshire, in April, 1756, died in London, Dec. 31, 1826. He was left an orphan in early childhood, and apprenticed to a shoemaker. His master refused to allow him to lighten the drudgery of his occupation by reading, but he nevertheless contrived by stealth to acquire a considerable knowledge of mathematics, and occasionally wrote verses. Some of the latter came into the hands of Mr. Oookesley, a surgeon, who raised a subscription to purchase his freedom. He was immediately put under the charge of a teacher, and although, with the exception of mathematics, his attainments were

then almost nothing, in 2 years he was fitted for the university, and entered Exeter college, Oxford, where he was appointed Bible reader. Having accidentally fallen under the notice of Lord Grosvenor, he was invited by that nobleman to live with him, and subsequently spent many years on the continent as the travelling tutor of his son. After his return to England, he published in 1791 his "Baviad," a paraphrase on the first satire of Persius, in which the popular Della Cruscan poetry of the day was happily ridiculed and effectually put down; and in 1795 the "Mæviad," an imitation of Horace, directed against the corruptions of the drama. His "Epistle to Peter Pindar," published in 1800, is one of the bitterest attacks ever directed against an opponent. Being now known as a keen political writer, he wrote with George Ellis and Frere for the "Anti-Jacobin" upon its commencement by Canning, and from this connection received two offices under government, which he held for life. In 1802 he published a spirited translation of Juvenal, with his own autobiography. He also translated Persius, and edited the dramatic works of Massinger, Ben Jonson, Ford, and Shirley. Upon the establishment of the "Quarterly Review" in 1809 he became its editor, a position which he retained until about 2 years before his death.

**GIFT**, a voluntary transfer of property of any kind. The word "give" is generally employed among the words of transfer in deeds of land; but by gifts, in law, are usually meant transfers of chattels or presents which are wholly without any pecuniary consideration, or any other consideration which the law recognizes as valid. They are usually divided into gifts *inter vivos* and gifts *causa mortis*. The latter are called in English gifts in prospect of death; and the former phrase, or gifts between the living, is not accurate, as describing but one class of gifts, because it applies to all, as only the living can give, and they can give only to the living. But gifts *causa mortis* may be defined as gifts made by one believing himself, on reasonable grounds, to be very near his death, and made in view of and because of this apprehension; and gifts *inter vivos* are all those which are not gifts *causa mortis*.—First, as to gifts *inter vivos*. Any person competent to transact ordinary business may give whatever he or she owns to any other person. The usual disabilities for legal action would apply here. Thus, a gift by an infant (i. e. a minor), a married woman, an insane person, or person under guardianship, would be wholly void, or would be voidable by the giver or one having authority to represent the giver, in much the same way that a transfer for consideration would be. Gifts, by persons competent to give, of property which they have a right to give, to persons competent to receive, and which are completed and effectual, are regarded by the law as executed contracts, founded upon mutual consent. It is absolutely essential to the validity of a gift that it should go into effect at once and completely. If it be



not a thing of the present, now done and finished, then it is no longer an act, but a promise. And as it must be, if a promise, wholly without consideration, because otherwise it is not a gift, it comes under the rule of law which makes promises without consideration of no legal validity, and incapable of legal enforcement. Hence, the very first rule in the law of gifts is, that delivery is essential to a gift. And this delivery must be to the donee; even if the giver deliver the money to a third person with orders to give it to the donee, and will therefore be bound if this third person give it to the donee before revocation, the giver may, at any time before the delivery to the donee, annul his directions to the party holding the money, and revoke and reclaim the gift. Generally, a court having equity powers will not interfere to enforce or complete a gift which is merely intended and promised. Nor will the transfer, if without delivery, be any the more effectual for being made in writing. As there must be actual delivery, so there must be actual acceptance; in other words, the thing given must pass out of the present power and possession of the giver, and into that of the donee. It is nevertheless true that a thing may be given, of which the present and immediate manual delivery is impossible. The delivery may, in such a case, be constructive, or symbolic, or any such delivery as the nature and actual position of the thing at the time may permit and require; as a delivery of a key which commands access to the thing, or a delivery of a part for the whole, where the whole is too bulky to be delivered otherwise. So also the delivery may be by an order upon a warehouseman or other person having the thing in his custody; but in this case the gift is not complete and effectual until the order be presented and completed or performed by the party on whom it is drawn. From the same necessity of completing the gift by delivery and acceptance, and from the same rules which make a mere promise without consideration voidable, it follows that if a gift be made by a note, or any instrument not under seal (for a seal is the equivalent of a consideration), it may be revoked by the donor. So if it be made by a check, draft, bill, or order, the giver may revoke it at any time before it is paid or executed, or accepted in such a way as to bind the drawee. And on the other hand, if any thing of consideration comes in, so as to make the gift while still lying in promise irrevocable, it changes the whole nature of the transaction, which is no longer a gift, but becomes a sale or barter, or an executory and enforceable contract, according to circumstances. A gift by a competent party, made perfect by delivery and acceptance, is then irrevocable so far as the donor himself is concerned; that is, he cannot revoke it and resume his property in the thing given merely at his own pleasure. But it may still be revoked or annulled, and the property resumed, by the creditors of the giver, if it was fraudulent as to them, either in fact or by construction of law.

If the giver knew at the time of the delivery that he could not then pay his debts, the gift was fraudulent in fact; if he were then insolvent, and did not know it, and so innocently by the gift diminished the fund to which his creditors were entitled, it was fraudulent in law. But it is thus void only in reference to existing creditors, and not as to persons becoming creditors subsequently, unless made when the insolvency was actual or immediately expected, or with actually fraudulent purpose as to future creditors. All voluntary transfers, as settlements of every kind and the like, if made in fraud of creditors, are considered as gifts in the law, and are void. In most of the United States the statutes respecting insolvency provide especially for all cases of this kind.—Gifts *causa mortis* can be made only when the donor has reason to believe that death is impending. The law watches over gifts *causa mortis* with great jealousy, and restrains them by rigorous principles and wise precautions, for the same reasons which induce it to lay down such precise and rigid rules in relation to wills and all testamentary dispositions. This reason is not any unwillingness that the wishes of the dead or of the dying should have their full effect, but from the extreme difficulty of giving them this effect, and yet closing the door effectually against, on the one hand, false and supposititious expressions of his will, or, on the other hand, undue and injurious influence exerted upon him as to the disposition of his property. Both of these reasons apply as strongly and directly to gifts made in prospect of death as to wills, or perhaps more so. Indeed, as these gifts are not unfrequently made in substitution of wills, and to avoid the special requirements made by the law in respect to wills, this is another reason why the law regards them with the suspicion felt toward acts which are evasions of law. Much that was said of gifts *inter vivos* is equally or indeed much more strongly applicable to gifts *causa mortis*. Thus, there must be not only delivery and acceptance, but this must be strictly actual, if that be possible without extreme inconvenience; and if impossible, in that case it must be something that is as near actual delivery as may be possible. It has even been said that no mere possession, although previous and continuous, is sufficient without delivery; as if the giver should say: "You may have and keep as your own the watch I have permitted you to wear for a year, and which is now in your pocket," this would not pass the property in the watch unless the giver took it into his own hands and gave it back to the donee; but we doubt whether the rule would be applied with so much severity. We have no doubt that the giver, if physically incapable, or perhaps if only unwilling to make the effort, might, without doing any thing himself, as well and effectually direct another in his presence to take such a thing and give it to such a donee, to be kept by him as his own. After some fluctuation it seems now to be settled that the donor's own note, or his



Dartmouth in 1589, lost at sea in 1584. He was educated at Eton and Oxford, followed the military profession, and was knighted in 1570 for his services in Ireland. Being interested in geographical discovery, both from love of fame and of adventure, he sailed in 1588 with 5 vessels and 260 men prepared to take possession of the northern parts of America, and founded a colony in Newfoundland, which, however, did not prove permanent. On the return his vessel, of only 10 tons burden, foundered in a storm, and all on board perished. He published a book in 1576, entitled "A Discourse of a Discovery for a new Passage to Cathay," to prove the possibility of a N. W. passage to India. He has been called the "father of western colonization."

GILBERT, WILLIAM, an English physician, born in Colchester in 1640, died Nov. 80, 1603. He was educated at Cambridge and Oxford, and was physician in ordinary to Queen Elizabeth. He is chiefly remarkable as the author of a work on magnetism (London, 1600), which, according to Prof. Whewell, "contains all the fundamental facts of the science so fully examined that even at this day we have little to add to them."

GILBERT ISLANDS, or KINGSMILL GROUP, a cluster of 15 coral islands belonging to the Mulgrave archipelago in the Pacific, between lat. 1° S. and 2° 30' N., long. 172° and 174° 30' E.; pop. estimated at 60,000. The largest are Taputeonea or Drummond's, and Taraway or Knox's islands, the former 80 m long by about  $\frac{1}{4}$  or  $\frac{2}{3}$  of a mile wide, and the latter 20 m. long. Almost the only cultivated products are the cocoanut and pandanus, which form the staples of food, and a species of taro (*arum cordifolium*), highly prized by the natives. The breadfruit is found on the northern, though not on the southern islands. The climate is equable, and though warm is not very oppressive. The inhabitants resemble the Malays. They are well made, slender, of middle size, somewhat darker than the Tahitians, with noses slightly aquiline, large mouths, full lips, small teeth, prominent cheek bones, and fine glossy black hair and beards. The women are much smaller in proportion than the men, and have slight figures, delicate features, and some marks of beauty. The people are divided into 3 classes, chiefs, landholders, and slaves. There is no general authority recognized throughout the group, but there are several kings, one of whom rules over 3 of the islands, while others are scarcely respected in any. In some places the government is administered by public assemblies. The islanders are sullen, passionate, cruel, treacherous, and dishonest. They are fond of war, and are much given to suicide, but they are kind to their children, generous, hospitable, and more considerate of women than is usual among savages. They are said to eat human flesh occasionally, but are not habitual cannibals. Their clothing is made of the leaves of the pandanus; their houses and canoes, though constructed of rude materials, are superior in size, strength, and ele-

gance to any others in the Pacific. The islands have several good harbors, but are seldom visited by vessels.

GILDAS, surnamed "the Wise," the most ancient native historian of Britain, born, according to some authorities, in 493, according to others, in 511, died in 570 or 590. He was the son of Oaw, a British prince who emigrated to Wales to avoid subjection to the Anglo-Saxons, and the Welsh bard Aneurin is supposed to have been either the same person or his brother. His only complete work extant is a short Latin composition on British history, entitled *De Calamitate, Excidio, et Conquestu Britannia*, in which he mourns over the ruin of his country, and inveighs against the British kings and clergy. It was first published by Polydore Virgil in 1525; later editions are by Gale (London, 1684-7), and by Stevenson, under the care of the English historical society (London, 1838), which is much the best. Translations have been published by Habington (London, 1688), and by Dr. Giles in "Bohn's Antiquarian Library" (1848). It is said by Wright that there is no independent authority for the personal existence of Gildas, or for the historical truth of the work attributed to him, which he regards as a forgery of the 7th century.

GILDING, covering the surfaces of bodies with a thin coating of gold, thus giving to them a highly ornamental exterior, that is not liable to tarnish. This method of economizing the precious metal, and imparting to solid bodies the appearance of being wholly composed of it, was practised at very remote periods. The sacred books allude to it; in Exod. xvi. 29 there is a command to overlay boards and bars with gold. That the early Egyptians understood it well is evident from the gilding on the coffins of Theban mummies, in which the gold leaves resemble those now prepared. Homer makes mention of it, and the later Greeks thus decorated the exterior sculpture of their temples and statues. The Romans after the destruction of Carthage applied the process to ornamenting the ceilings of their public buildings, and at last of their private houses also. The thickness of the leaf is spoken of by Martial as like a vapor, and by Lucretius the substance is compared to a spider's web. From Pliny's account an ounce of gold was made into 750 leaves, each 4 fingers square. This is about 3 times the thickness of the leaf now in common use; but some qualities are so thin that 290,000 sheets make a pile only one inch in height; and specimens have been made only  $\frac{1}{1000}$  of an inch thick, which is 1,200 times thinner than ordinary printing paper. In modern times the use of gilding in architecture is carried to the greatest extent by the nations of Ohin-India or Further India. It is practised by them with great skill and in the most profuse manner.—Beside the method of gilding by covering with gold leaf, there are processes of modern invention, distinguished as chemical gilding, in which the gold is incorporated with

the substance of the article it covers, and the same quantity is thus made not merely to spread over a much larger surface, but to be permanently attached to metallic bodies, so as to withstand the action of heat and of atmospheric agents without injury—an art incompatible with the attainments of the ancients in chemistry.—Gilding with gold leaf is distinguished as the mechanical branch of the art; and of this there are two distinct processes, one of which is called burnish gilding or gilding in distemper, and the other oil gilding. In the former the article to be ornamented, as the moulding of a picture frame, is received from the joiner before it is made up. A priming of hot size and whiting, carefully prepared of the best materials, and called thin white, is first applied. When dry, all irregularities in the moulding are filled in with the same composition, made of the consistency of putty. Four or five coats of the priming are afterward applied, made thicker than at first, and called thick white, each being allowed to dry before the next is laid on. In these intervals the fine work of the moulding is kept open by the use of suitable scooping tools for this purpose; or the mouldings may be coated at once with two thick whites laid on one upon the other without waiting for the first to dry, and worked into the intricate portions by the aid of hard stones of suitable shape and by the opening tools. The priming, which is now  $\frac{1}{4}$  to  $\frac{1}{2}$  of an inch thick, is carefully trimmed around the edges and smoothed with pumice stone, and finally with shave grass or glass paper. This is the foundation for the so called gold size—the bed upon which the gold leaf is to be laid—a composition of clay, red chalk, plumbago, suet, and bullock's blood; or, as used by the French, of a pound of Armenian bole to two ounces of red hematite (bloodstone) and as much galena, each ground by itself in water, then mixed and ground with a spoonful of olive oil, and at last tempered with a clear white glue carefully prepared from sheep skins. The former mixture is sold to the gilders. It is of thinner consistency than butter, and when used is first melted with thin size, and then while warm is laid on with a brush. The work is now ready for the gold leaf. The gilder, with a leathern cushion attached to the left hand, on which the leaves are to be spread, and, between the fingers of the same, a knife, camel's hair pencil, and a sort of brush called a tip, by which the gold leaves are to be taken up, opens the book which contains the leaves, and by his breath blows them one by one upon the cushion. With the knife, assisted by the breath, he arranges one leaf, and cuts it into the size he requires for fitting any part of the moulding. He then raises it by touching to it the hairs of the tip, and transfers the slip to the part of the work which has been moistened to receive it, the hollow parts receiving the first applications. If the gold does not adhere to the tip, this is rubbed across the cheek or the palm, when the hairs acquire their proper action. Strip after

strip is laid on with great nicety, each overlapping the preceding one about  $\frac{1}{4}$  of an inch, and each carefully pressed down with a camel's hair brush. When the whole is covered and dried, the work is burnished with smooth agates or flints set in handles for this use. The yielding nature of the bed upon which the gold leaf is laid prevents this from being injured in the process. Portions of the work not intended to be polished are passed over without burnishing, and are afterward washed with thin clear size, and when dry are wiped with cotton wool. Any defects in the work are now repaired with more gold leaf, and the article is ready to be returned to the maker to be made up, after which it may again come into the gilder's hands to be retouched in places.—Oil gilding is practised by several different methods; for large objects, especially those exposed to the weather and of metallic composition, the priming used in Paris is white lead mixed with linseed oil and a little oil of turpentine. For equipages and indoor work a varnish polish is much used over the gold. For elaborately designed frames oil gilding and burnish gilding are often employed upon the same piece, care being taken that the applications for the former do not touch the spots intended to be burnished, which are treated in the manner already described. The frames intended for this process are furnished to the gilder made up. They are then thoroughly washed, and afterward receive 2 or 3 coatings of thin white, and more upon the parts to be burnished. A strong size called clear cole is then laid in several coats over those parts only intended for oil gilding, and upon this the oil gold size, a mixture of boiled linseed oil and ochre. By standing over night this becomes ready for the gilding, which is effected without using water. The gold leaf is pressed with cotton wool into all the depressed portions, and when all is laid the work is smoothed over with a brush, by which its irregularities are removed, and the gold is uniformly distributed. Old work is regilded by washing off the old gold and a portion of the gold size, and renewing this as in new work. But oil gilding which cannot be thus removed is well scoured, when it is ready for renewal.—Book covers are ornamented with gilt letters and figures in the following manner. If of cloth, the leaf is laid on over the parts to be ornamented, and the cover is then placed in a press, in which a heated metallic block, having the intended designs cut upon its face, is powerfully pressed against the cover as in printing. The heat of the block causes the glue on the back side of the cloth to melt and come through, and thus fasten the figure to the fabric. Leather covers receive an application of gelatine or of the white of egg dissolved in water, upon which when dry an almost imperceptible application of oil is made with a rag, and the gold leaf is then laid to be pressed as in the case of the cloth. The edges of the leaves are gilded in the bookbinder's press, the same gelatine solution and oil being applied, upon

which the gold leaf is laid and afterward burnished. Chemical gilding is particularly applicable to metallic surfaces, but other surfaces, as of wood, leather, or paper, may be coated with some preparation by which they are rendered fit for it.—Wash or water gilding is the branch of this art in which the gold is applied by means of an amalgam of gold and mercury. In other processes it is deposited from its solution. Copper, or an alloy of copper with a little zinc, or zinc and nickel, or brass, is well suited for the amalgamation process; the nearer the color is to that of gold the better. The surface to be gilded must first be thoroughly cleaned and brightened and freed from oil; and it is then advisable to wash it over with a solution made of 100 parts by weight of mercury in 110 of nitric acid, of specific gravity 1.33, diluted with 25 times the weight of the whole of pure water. This application leaves a coating of mercury upon the metal, which is more ready to take the amalgam than is the metal itself. Both the mercurial solution and amalgam are sometimes applied together by means of the gilder's scratch brush, which is dipped into the former and immediately rubbed over the latter, and then applied to the metal—the process being repeated as often as necessary. After the application the article is washed in water and exposed to glowing charcoal to expel the mercury. The amalgam is prepared by heating small particles of gold to redness and throwing them into a quantity of mercury heated so as to emit fumes, and stirring with an iron rod till the gold is dissolved. There should be about 8 times as much mercury as gold, and the excess of the former is removed by squeezing the amalgam when cold through buckskin. The composition then contains about 57 parts of mercury to 33 of gold. In driving off the mercury, too high or too sudden an application of heat is to be guarded against, and care should be taken to turn the article frequently, that all parts may be exposed alike. While the process goes on the amalgam may be reapplied with a long-haired brush wherever it is needed, the article being taken from the fire for the purpose and immediately returned. The gold thus deposited is of a dull yellow, and still retains some mercury, even though the heat to which the article was exposed caused a drop of water to hiss upon its surface. This excess is removed after washing and scrubbing the article with a scratch brush acidulated with vinegar, by applying the so called gilding wax, and again heating. The wax is a mixture of beeswax with some of the following substances, viz.: red ochre, verdigris, copper scales, alum, vitriol, borax. When the wax is burned off, the color of the gilding is found to be improved, and this is still further heightened by burnishing. The color is also improved by covering the gilt surface with a composition of common salt, nitre, and alum, ground together and made into a paste with water, or dissolved in the water of crystallization of the alum. The metal is then exposed

to heat sufficient to thoroughly melt this composition, which runs over its surface. The piece is then taken from the fire and suddenly plunged into cold water, which causes the saline crust to fall off. It is finally washed with dilute nitric acid, and then with water, and dried. The amalgamation process is not well adapted for gilding articles of iron and steel, an oxide of iron being produced by the acid applications, which prevents the adhesion of the amalgam. For these the best method is to cover them with gold leaf. Copper may be treated in the same way. The metal is heated till it begins to assume a blue color; a sheet of gold leaf is then laid on and gently pressed with a burnisher, and the article is again heated. Other sheets are laid over the first to the desired thickness and heated, and the last is burnished down cold. The surface of iron, whether wrought or cast, or of steel, is sometimes covered with a coat of copper; but the following method of preparing such surfaces for fire gilding is given in Poggen-dorf's *Annalen* for 1846, by R. Boettger. The iron or steel is introduced into a mixture of 13 parts of mercury, 1 part of zinc, 2 of sulphate of iron, 12 of water, and 1½ of hydrochloric acid of specific gravity 1.2, which is then heated to ebullition. The object is soon coated with a film of mercury, upon which the amalgam of gold may be applied in the usual way. By a strong heat the mercury is driven off, together with any zinc that may have attached itself to the iron.—To gild silver, a very good process is that called cold gilding. Sixty grains of fine gold and 12 of rose copper are dissolved in 2 ounces of aqua regia. The whole of the solution is absorbed by linen rags, which are then dried and burned to ashes. The black powder thus obtained is applied upon the silver, which has been annealed and polished, and is rubbed in with a piece of moistened cork or wash leather. Burnishing completes the process.—A method of gilding buttons and other articles by immersing them in solutions of gold was introduced into the establishment of the Messrs. Elkington, in Birmingham, in 1836, by which the injurious effects of the amalgamating process on the health of the workmen were avoided. To a solution of chloride of gold prepared from one part of gold, 80 parts of bicarbonate of potassa are gradually added, and then 80 parts more of bicarbonate dissolved in 200 parts of water. The whole is then boiled 2 hours, and the color of the liquid changes from yellow to green. The articles, being perfectly well cleaned and annealed, are immersed for an instant in a mixture of equal parts of nitric and sulphuric acids, to which, if the gold is intended to have a dead appearance, a little chloride of sodium is added. The articles, washed in water, are plunged in the gold solution, and left half a minute, when they are removed, again washed, and dried in hot sawdust. Articles of German silver, of platinum, or silver, may be gilded by suspending them by copper or zinc wires for a time in the liquid.—For gilding porcelain or

glass, gold precipitated by sulphate of iron is mixed with  $\frac{1}{2}$  its weight of oxide of bismuth and a small quantity of borax and gum water, and the mixture is then applied with a camel's hair pencil. The article is heated in a muffle, and when taken out the gold is burnished, and finally cleansed with vinegar or white lead. Vases and articles not exposed to wear may be gilded by fixing gold leaf upon them with copal varnish.—For the most perfect method of gilding, and one which has almost entirely taken the place of the amalgamation process, see **ELECTRO-METALLURGY**. For the process of gilding the backs of books, see **BOOKBINDING**.

**GILEAD** (Heb. *gal*, mound or heap, *ed*, witness, Gen. xxxi.), the name of a mountain group in the eastern division of ancient Palestine or Perea, extending with various branches nearly over the whole of it. From it the southern districts of the same division were also called Gilead, which is often mentioned in contradistinction to Bashan in the north, but exceptionally also as including the latter region. The cities Ramoth and Jabesh are generally defined by the addition of Gilead as the region in which they were situated. This was rich in pastures, and renowned for its aromatic simples, from which balsam was prepared. Among its rivers were the Jabbok and the Arnon.

**GILES**. I. A. S. W. co. of Va., intersected by Kanawha or New river; area, about 550 sq. m.; pop. in 1850, 6,570, of whom 657 were slaves, since which time the county has been divided and Craig co. formed out of its N. E. part. Its surface is high and rugged, its mean elevation being 1,600 feet above the ocean; the principal summits are Peter's and Walker's mountains. The soil of the uplands is poor, but the valleys and river bottoms are very fertile. The productions in 1850 were 304,720 bushels of Indian corn, 88,565 of wheat, 68,494 of oats, 1,960 tons of hay, 83,120 lbs. of butter, and 23,591 of wool. There were 17 churches, and 820 pupils attending public schools. Value of real estate in 1856, \$1,179,716. Named in honor of William B. Giles, governor of Virginia in 1828. Capital, Parisburg. II. A. S. co. of Tenn., bordering on Ala., watered by Elk river and some of its branches; area, 600 sq. m.; pop. in 1850, 25,949, of whom 9,358 were slaves. It has a slightly uneven surface, and a fertile, well-tilled soil. The productions in 1850 were 1,857,647 bushels of Indian corn, 81,537 of wheat, 185,804 of oats, 10,801 bales of cotton, 822,487 lbs. of butter (the greatest quantity made in any county of the state), and 10,693 of tobacco. There were 36 corn and flour mills, 16 saw mills, 2 tanneries, 1 newspaper, 54 churches, and 1,123 pupils attending public schools. Capital, Pulaski.

**GILES, HENRY**, an American clergyman and author, born in Cranford, co. of Wexford, Ireland, Nov. 1, 1809. His public education was received at the royal academical institution of Belfast. Educated in the Roman Catholic church, after various changes of opinion he joined the Unitarian body, and officiated as

pastor in Greenock for 2 years, and in Liverpool for 3 years. In 1840 Mr. Giles came to America, where he has been extensively engaged in lecturing, with occasional services in different parishes as a preacher. He has written much for the public press both in Europe and this country; and he delivered 4 of the 13 lectures in the celebrated Liverpool controversy between the Episcopalians and the Unitarians in 1839. His published works are: "Lectures and Essays" (2 vols., Boston, 1845); "Christian Thoughts on Life" (1850); and "Illustrations of Genius in some of its applications to Society and Culture" (1854). As a lecturer and orator, he has spoken to large audiences in the principal cities of the Union for successive winters; has addressed many literary societies and library associations, and given one course of lectures before the Lowell institute in Boston, on the "Genius and Writings of Shakespeare." He has resided with his family for several years in Bucksport, Maine.

**GILES, WILLIAM BRANCH**, an American statesman, born in Amelia co., Va., Aug. 12, 1762, died at "The Wigwam," in the same county, Dec. 4, 1830. He was educated partly at Hampden Sidney and partly at Princeton college, N. J., though he was not graduated, as he quitted Princeton before completing the usual course. He studied law at Williamsburg, Va., with Chancellor Wythe, was admitted to the bar, and practised for 5 or 6 years with a high reputation as an advocate. He, however, did not like the profession, and abandoned it in 1790 to engage in politics. He was elected by the federal party in the Petersburg district to fill a vacancy in congress occasioned by the death of Col. Bland, and took his seat in Dec. 1790. In Jan. 1791, he opposed the bill for creating a bank of the United States, on the ground that it was little better than a scheme for enriching the bankers at the expense of the public. His course on this question led to his estrangement from the federal party, and to his affiliation with the democrats. On Jan. 23, 1793, he made in the house an attack upon Alexander Hamilton, then secretary of the treasury, charging him with corruption and speculation, and alleging that he had failed to account for \$1,500,000 of the public money. Hamilton vindicated himself triumphantly in a report dated Feb. 4. Giles replied, Feb. 28, by proposing resolutions censuring the secretary for undue assumption of power, and for want of respect for the house. These resolutions were laid on the table by very large majorities; the mildest of them got only 15 votes. In 1796 Giles strongly opposed the creation of a navy and the ratification of Mr. Jay's treaty with Great Britain, and in 1798 the proposed war with France for her outrages on American commerce. In 1798 he declined a seat in congress in order to become a member of the legislature of Virginia, where he cooperated with Madison in procuring the passage of the celebrated resolutions of '98. In 1801 he was again elected to congress. His

career in the house terminated in 1802. He was from the beginning of his service as a member always among the foremost in debate, for success in which he possessed extraordinary qualifications. In Aug. 1804, he was chosen U. S. senator, and continued in that office till 1815. He took at once the position of democratic leader in the senate, and held it till 1811, when he openly manifested his opposition to the administration of President Madison. He abandoned public life in 1815 to attend to his private affairs, and remained in retirement till 1826, when he was induced to become a member of the legislature of Virginia, partly from hostility to the administration of John Quincy Adams, and partly from his strong opposition to the project of calling a convention to revise the constitution of Virginia. He made a powerful speech against this project, in Jan. 1827, which defeated it for a time. In the same year he was elected governor of the state, and held the office for 3 years. The bill for calling a convention was revived and passed at the session of 1827-'8, and Mr. Giles while governor was chosen a member of it. The convention sat in 1829-'30, and he took a distinguished part in its deliberations. Mr. Giles published in 1818 "Political Letters to the People of Virginia," and subsequently various letters on political topics.

GILFILLAN, GEORGE, a Scottish clergyman and author, born at Oomrie, Perthshire, in 1818. The son of a minister of the Secession church, he was educated for the same profession, and has officiated since 1836 as minister of the School wynd congregation at Dundee. His first literary sketches appeared about 1842 in the "Dumfries Herald," and were published in 1845 under the title of a "Gallery of Literary Portraits" (2d ed. 1851). A 2d series appeared in 1849 (2d ed. 1852), and a 3d series in 1855. A new edition of the 1st and 2d series was published in 1854. One of his most successful works was the "Bards of the Bible" (1850; 4th ed. 1856). He has since published "The Book of British Poesy, Ancient and Modern" (1851); "The Martyrs, Heroes, and Bards of the Scottish Covenant" (1852; 2d ed. 1854); "The Grand Discovery" (1854; 2d ed. 1856); "History of a Man" (1856); and "Christianity and our Era" (1857). He has also written a "Discourse on Hades," "Five Discourses on the Abuse of Talent," and a little volume of poems and songs. He is an active contributor to the periodical press, has published an edition of W. O. Bryant's poems, with notes and an introductory essay, and has been connected with various other literary enterprises either as author or editor. Since 1858 he has been engaged in preparing a library edition of English poets with biographical and critical notes.

GILL, a measure of capacity, containing the fourth part of a pint, or 8.665 cubic inches. In London it is commonly called a quartern.

GILL, JOHN, an English divine and rabbinical scholar, born in Kettering, Northamptonshire, Nov. 23, 1697, died in London, Oct. 14, 1771.

He began to preach at an early age, and in 1719 went to London as pastor of a Baptist church at Horsleydown, Southwark, which in 1757 removed to Carter lane, near London bridge, where he continued till his death. He wrote voluminously on doctrinal subjects. His most important work is the "Exposition of the Old and New Testaments" (9 vols., London, 1743-'63), which is especially valuable for its illustrations derived from rabbinical literature. He also wrote a "Treatise on the Doctrine of the Trinity" (1731); the "Cause of God and Truth" (1735-'8), a defence of Calvinism against Arminianism; and a "Dissertation concerning the Antiquities of the Hebrew Language, Letters, Vowel Points, and Accents" (1767).

GILLESPIE, a central co. of Texas; area, 1,980 sq. m.; pop. in 1857, 2,800, of whom 102 were slaves. It has a hilly surface, about  $\frac{1}{2}$  part of which is suitable for farming, while the remainder furnishes good pasturage. Iron ore, limestone, and coal are the most important minerals. The staples are cattle, horses, sheep, hogs, and Indian corn, and the productions in 1850 were 15,240 bushels of Indian corn, and 4,880 lbs. of butter. In 1857 the county contained 1,078 horses, and 16,160 head of cattle, 8 saw and grist mills, 4 or 5 churches, and 250 pupils attending public schools. Value of real estate, \$284,200. Capital, Fredericksburg.

GILLESPIE, WILLIAM MITCHELL, LL.D., an American author, professor of civil engineering in Union college, at Schenectady, N. Y., born in New York in 1816. He was graduated at Columbia college in 1834, published in 1845 an entertaining volume entitled "Rome as seen by a New Yorker in 1843-'4," and was called in the same year to the professorship in Union college which he still holds. His work entitled "Roads and Railroads, a Manual for Road-making" (New York, 1845; 7th ed. 1854), is one of the best treatises on the subject. In 1857 he published the "Philosophy of Mathematics," from the French of Auguste Comte, and in 1855 (6th ed. 1858) a highly esteemed work on the "Principles and Practice of Land Surveying."

GILLIES, JOHN, LL.D., a Scottish historian, born in Brechin, Forfarshire, Jan. 18, 1747, died in Olapham, near London, Feb. 15, 1836. He was educated at the university of Glasgow, where he officiated for a time as professor of Greek. After a short visit to London and the continent, he was appointed tutor in Lord Hopetoun's family, and was rewarded with a pension for life. In 1778 he published a translation of the "Orations of Lysias and Isocrates." In 1786 he published in London his "History of Ancient Greece." In 1793, on the death of Dr. Robertson, he was made historiographer royal for Scotland, which brought him a salary of £200 a year. His principal work, beside the above named, is the "History of the Ancient World from Alexander to Augustus" (London, 1807), which was afterward republished as the second part of his "History of Greece."

**GILLIFLOWER**, the trivial name of a beautiful and fragrant garden plant (*Matthiola incana*, R. Brown), belonging to the *crucifera*, an order comprising many delicate and ornamental species, as well as many useful vegetables, such as the cabbage, radish, mustard, &c. The gilliflower was found on the cliffs east of Hastings, Sussex, England, by Messrs. Borrer and Turner, in 1808, growing in such situations as to preclude the idea that they were other than natural habitats. The gilliflower is strictly a biennial plant, blossoming in the second year, but by care it has been made to survive for several, so much so as to acquire the name of perennial among florists, instances being known of its blossoming until the 6th year from seed. Several distinct varieties have been obtained by cultivation, such as the double or multiplex petalled, with the same colored flowers as the original species, also the scarlet with double flowers, commonly called the Brompton, and the double white branching. Many sub-varieties beside are now known under the names of Brompton and queen stocks, comprising a great variety of beautiful colors, of which the scarlet, the white, and the purple are most esteemed. The successful raising of these requires some care, especially as a profusion of flowers is desirable; in the greenhouse or parlor they are very attractive in the spring months. The most common way to raise them is from seed, although cuttings will root with care; such plants, however, will always prove dwarfish and stunted. The seeds are to be sown in June in drills 8 or 10 inches apart; the soil should be fine, rich, and light, and the seeds should be covered about  $\frac{1}{2}$  inch deep. After they are up they should be thinned out occasionally, leaving the young plants about 4 inches apart; they should be kept clean from weeds, and a rapid growth promoted by frequent waterings. Early in July they should be transplanted into small pots, a single plant to a pot, using for soil a good rich sandy loam, and watering them well. Set them aside in a shady place for a week or 10 days, and afterward remove them to a summer aspect, where they may stand till August, when they will need shifting to a pot one size larger. On approach of frost they are to be taken into the greenhouse or sitting room; or if a considerable number are needed for successive blossomings, they can be wintered in well protected frames, or kept in light dry cellars. If repotted toward February for the greenhouse, they will soon come into flower and make a fine show; what remain can be turned out into the open flower border in May, to bloom in June and July. If only a few pots are needed, the process can be modified. After blooming, the old plants can be cut in or headed back, cutting down to a strong leaf, and new blossoms will soon appear. This is advisable sometimes when the seedling plant proves to be a fine sort. Although none but single flowers, or those at least with a few petals, produce any seeds, yet such is the tendency to depart from the normal number of petals, that a large proportion of the plants

have very multiplex blossoms. Doubtless the long cultivation of the species in highly exciting soils has produced this tendency, from which nature is slow to depart. The 10 weeks stock gilliflower (*M. annua*) does not require so much care to bring it to perfection; it is very easily grown, and masses of it planted out in the open border will fill the air with delicious perfume, while they add greatly to the beauty of the garden. The varieties of this gilliflower are almost immense, including what are termed the Russian or close-flowering and the German, which have all hues and tints. These latter are due to the care and patience of the laboring classes in Germany, who bestow great pains upon the rearing of these favorite plants. All the 10 weeks stocks are of less robust habit, are less branching, and are very compact both in foliage and flower; hence their dwarfer style fits them for planting in beds, borders, or masses, at the taste of the florist or gardener. The seeds are to be sown at different periods, if plants are wanted to blossom successively; and 8 or 4 sowings are sufficient from February to August. Of course the two first will be sown in the frame or in the greenhouse; the latter can be sown in shallow boxes or in the open ground. When to be transplanted for indoor flowering, very small pots should be used, as these will answer quite as well and occupy less space. On being required to blossom, they are to be transferred to pots of larger size in soil of three quarters light loam and one quarter well decomposed manure. Though an annual, and coming into blossom usually in a few weeks, whence their name, yet instances are known of their prolonged vitality by a process of shortening in the shoots after the first blooming. The foliage of the gilliflower is usually covered with a soft down or pubescence; but kinds exist where no such pubescence, is found; such are called wall-flower leaved, and are much esteemed. A species in the south of Europe (*M. tristis*) has a very downy aspect in its leaves and stems; its flowers have a sombre hue, are of a dull brown color, not attractive, but on close inspection the petals will be found to have beautiful veinings upon their surfaces. These blossoms are scentless during the day, but redolent with grateful odor on approach of the night. Of this character is *M. odoratissima* (Persian gilliflower) and *M. livida*, from whose dull-colored flowers those singularly hued 10 weeks stocks known as the chamœis, cinnamon, clay-yellow, peach blossom, and the like, it is conjectured, have been at some time procured by hybridizing or by similar processes.

**GILLRAY, JAMES**, an English engraver and caricaturist, born in Chelsea in 1757, died in London, June 1, 1815. He was the son of a Chelsea pensioner, became a student in the royal academy, and about 1784 became known as a successful engraver. Between 1779 and 1811 he published 1,200 caricatures, many of which were etched at once upon the copper without the assistance of drawings. The royal family and prominent cabinet ministers and politicians of the



day were ridiculed by him without mercy. He died of delirium tremens. His works appeared singly, but a collection of them was published in London in 1830, and an edition has since been published by Bohn.

GILMAN, JOHN TAYLOR, governor of New Hampshire, born in Exeter, N. H., Dec. 19, 1759, died in the same place, Aug. 31, 1828. In 1775, on the morning after the news of the battle at Lexington and Concord reached Exeter, he marched with 100 other volunteers to Cambridge, Mass., where he served in the provincial army. Soon after, his father being made treasurer of the state, he became his assistant in the office. In 1780 he was a delegate from New Hampshire to the convention which met at Hartford to take measures for the defence of the country. In 1782 and 1783 he was a member of the continental congress, and in the latter year succeeded his father as treasurer of New Hampshire. He was one of the 3 commissioners appointed by the government of the old confederation to settle the accounts of the different states. In 1797 he was chosen governor, and was annually reelected for 10 successive years. In 1813, '14, and '15 he was again elected governor, after which he declined to be a candidate. He was a zealous federalist, and his popularity in New Hampshire was so great, that he was frequently chosen governor when his party was in the minority. His name is still held in veneration for honesty and patriotism.

GILMAN, SAMUEL, D.D., an American clergyman and author, born in Gloucester, Mass., Feb. 16, 1791, died in Kingston, Mass., Feb. 9, 1858, while on a visit to a married daughter in that place. He was graduated at Harvard college in 1811, studied theology, and was tutor in mathematics at Cambridge from 1817 to 1819, when he married Miss Caroline Howard, and was ordained pastor of the Unitarian church in Charleston, S. C., in which office he remained till his death. He contributed many papers to the "North American Review," "Christian Examiner," "Southern Quarterly Review," and other periodicals, on a variety of subjects connected with philosophy and general literature, and in 1856 published in Boston a volume of "Contributions to Literature, Descriptive, Critical, and Humorous, Biographical, Philosophical, and Poetical." His other prose works are the "Memoirs of a New England Village Choir" (1829), of which 8 editions have been issued, and the "Pleasures and Pains of a Student's Life" (1852). He translated the satires of Boileau, and published some original poems, among which are the "History of a Ray of Light," and a poem read before the Phi Beta Kappa society of Harvard college. He took a prominent part in Charleston in promoting the temperance cause, as well as the interests of literature.—CAROLINE, wife of the preceding, an American authoress, born in Boston, Oct. 8, 1794. She is a daughter of Samuel Howard of Boston, and passed her childhood at

various schools in Concord, Cambridge, and other towns of Massachusetts. At the age of 16 she wrote a poem entitled "Jephthah's Rash Vow," and soon after another on "Jairus's Daughter," which was published in the "North American Review." In 1819 she was married to the Rev. Samuel Gilmer, and removed with him to Charleston, S. C., where she has since resided. She began to edit in 1832 the "Rosebud," a juvenile weekly newspaper, which subsequently took the name of the "Southern Rose," and contained articles of much literary merit. From this periodical she has reprinted at different times the "Recollections of a New England Housekeeper," "Recollections of a Southern Matron," "Ruth Raymond, or Love's Progress," "Poetry of Travelling in the United States," "Verses of a Lifetime," "Mrs. Gilman's Gift Book," and other volumes. The first two of these works attracted particular attention by their practical lessons as well as their genial simplicity and humor, and have passed through many editions. She is especially successful, also, in her books for children. Her later publications are "Oracles from the Poets" (1854), and the "Sibyl, or New Oracles from the Poets" (1854), consisting of passages of verse ingeniously arranged to correspond to numbers which are to be taken at random.

GILMANTON, a post village and township of Belknap co., N. H., 25 m. N. E. of Concord; pop. of the township in 1850, 3,282. It has manufactories of hardware, shoe pegs, carriages, &c., contains a cotton factory, 5 grist and 11 saw mills, 4 tanneries, an academy, and 10 churches, and is the seat of Gilmanton theological seminary, under the charge of the Congregationalists. It was founded in 1835, has 3 professors, 26 students, and a library of 4,500 vols.

GILMER. I. A N. W. co. of Va., watered by Little Kanawha river; area, 512 sq. m.; pop. in 1850, 3,475, of whom 72 were slaves. It has a rough surface, much of which is thickly wooded, and a rich soil, suitable for grain and pasture. There are several salt springs and iron mines. The productions in 1850 were 117,990 bushels of Indian corn, 5,652 of wheat, 22,085 of oats, 1,023 tons of hay, 33,277 lbs. of butter, and 4,961 of tobacco. There were 2 corn and flour mills, 1 saw mill, 1 tannery, 5 churches, and 159 pupils attending public schools. Value of real estate in 1856, \$339,259. Formed from Lewis and Kanawha counties in 1845, and named in honor of Thomas W. Gilmer, member of congress from Virginia. Capital, Glenville. II. A N. co. of Ga., drained by Coosawatee and other rivers; area in 1852, 792 sq. m., and pop. 9,994, of whom 205 were slaves, since which time it has been divided to form Fannin co. on the N. and E. Several spurs of the Blue Ridge, abounding in beautiful scenery, and alternating with fertile valleys, traverse parts of the county. The mineral products, comprising gold, marble, and iron, are valuable and abundant. The staples are grain,

potatoes, and hay. In 1850 the harvest amounted to 214,198 bushels of Indian corn, 24,894 of oats, 20,097 of sweet potatoes, and 5,805 lbs. of rice. There were 2 corn and flour mills, 3 saw mills, 1 tannery, 12 churches, and 205 pupils attending public schools. Named in honor of George R. Gilmer, governor of Georgia in 1880. Capital, Ellijay.

GILOLO, or ALMAHERA. See MOLUCCAS.

GILPIN, BERNARD, an English ecclesiastic, born in Kentmire, Westmoreland, in 1517, died in Houghton, Durham, in 1588. He was educated at Oxford. At first a Roman Catholic, and a zealous opponent of the reformers, he became a convert to Protestantism after a disputation with Peter Martyr, and in 1552 was made vicar of Norton in the diocese of Durham. On the accession of Mary he went abroad for 8 years. On his return he was kindly received by his uncle, Dr. Tunstall, bishop of Durham, who appointed him his archdeacon, and gave him the living of Houghton, of which he remained rector till his death, declining the bishopric of Carlisle, which was offered to him. His parish and the neighboring neglected parishes, which he regularly visited, comprised a wild rugged district on the Scottish border, whose inhabitants, from centuries of marauding warfare, were in a half savage state. He went fearlessly among them, and by his preaching and benevolence acquired the titles of the apostle of the north and the father of the poor. Such was his hospitality, that every fortnight 40 bushels of corn, 20 bushels of malt, and a whole ox, with ample supplies of other kinds of provision, were consumed in his house; while on every Sunday from Michaelmas to Easter all his parishioners with their families were expected to visit him, 8 tables being constantly set for them. He preached so boldly against the vices of the times, and especially of the clergy, that complaints were made against him successively to the bishops of Durham and the bishop of London. He built and endowed a grammar school in his parish for the instruction of the children of the poor, and regularly educated at his own house 24 lads of promise whom he ultimately sent to the university. His life has been written by George Carleton (London, 1628), and by William Gilpin (London, 1751).

GIMBALS (Lat. *gemellus*, twin), a contrivance by which instruments, as mariners' compasses, nautical barometers, &c., are kept in a proper position for observation, and comparatively quiet, however disturbed the movements of the vessel in which they are carried. It consists of two concentric rings or hoops, one suspended within the other by two pivots opposite each other, and the outer one secured to a box or fixed object. Within the inner ring the instrument is suspended by two opposite pivots placed at right angles to those by which the ring is suspended. It thus swings freely in two directions at right angles, and maintains a vertical position, and when used for the compass card always presents this horizontally.

VOL. VIII.—17

GIN, or GENEVA (Fr. *genièvre*, juniper), an alcoholic liquor, originally made in Holland, and still manufactured there upon a large scale in the distilleries of Schiedam. The great popularity acquired by this liquor has induced many attempts to reproduce it in Great Britain; but the difference between "Hollands" and "British gin" has always been very marked in favor of the former. The following account of the process of manufacture is given by Dr. Muspratt, as furnished to the late Dr. Thomson by a gentleman who spent several years in Holland solely to become familiar with the operation. (For general details of the process, see DISTILLERY.) The grains employed are only rye and barley. Of the former 228 lbs., and of barley malt 112 lbs., are mashed with 460 gallons of water at 162° F.; after infusion has taken place, cold water is added to bring the strength to 45 lbs. per barrel, or specific gravity 1.047, at which strength, after it has cooled to 80° F., it is run into the fermenting tun. To the contents of the fermenting back, which is about 500 gallons,  $\frac{1}{2}$  gallon of good yeast is added; fermentation speedily sets in, the temperature rises to about 90°, and the attenuation is complete in about 48 hours. After attenuation of the mash, from 12 to 15 lbs. per barrel of saccharine matter remain undecomposed in the fermented liquor. The mash and grains are then introduced into the still, and the whole of the low wines distilled over; these are subjected to a second distillation, and the distillate after rectification is the famous geneva. A few juniper berries and sometimes hops are added in the rectification, to impart to the spirit a peculiar terebinthine flavor. Dr. Muspratt remarks upon the imperfect attenuation of the worts in this process, and the small amount of yeast employed in bringing about the fermentation. The British and Irish distillers obtain double the quantity of spirits from the same amount of worts, and this, he thinks, together with the great quantity of yeast they employ, may account for the difference in the flavor.—But the common article of British gin is made very differently. The rectifiers of the Scotch and English whiskey employ for its manufacture the faints or impure products of the distillation of this liquor, rectifying it by one or more distillations, and flavoring it with juniper berries and other substances, most of which are aromatics. A number of receipts in use are given by Dr. Muspratt, from the note book of one of the most extensive and respectable distillery rectifiers in the kingdom, to exemplify the "most absurd and uncouth fashion" in which these processes are conducted. One of these receipts is as follows: 960 gallons of spirit, hydrometer proof, 96 lbs. German juniper berries, 6 lbs. coriander seeds, 4 lbs. grains of paradise, 4 lbs. angelica root, 2 lbs. orris root, 2 lbs. calamus root, 2 lbs. orange peel; 80 or 90 lbs. of liquorice powder are occasionally added to impart color and sweetness. Such additions to the spirit are called "gin flavorings." Beside the ingredients named car-

away seeds, cassia buds, crushed almond cake, lemon peel, and sulphuric acid are used in other receipts. For the west country gin, much used in Cornwall, the receipt is to introduce into the still 700 gallons of the second rectification of whiskey faints, and flavor with 14 lbs. German juniper berries, 1½ lbs. calamus root, cut, and 8 lbs. of sulphuric acid. The manufacturing processes, however, furnish but an imperfect indication of this article as actually consumed. As it passes into second hands, it is commonly reduced by adding water, the effect of which is to render the mixture whitish and turbid by precipitating the oily and resinous matters that were held in solution by the spirit. These must either be redissolved or removed by a process of clarification, or, as it is called, "fining." Alum dissolved in water and subcarbonate of potash are commonly employed for the latter purpose. The alumina set free carries down with it as it subsides the finely divided oily matter, which produces the blue color of the diluted liquor, and these are replaced in the solution by sulphate of potash formed in the double decomposition of the two salts. A reprehensible practice prevails of using subacetate of lead in place of the potash salt, by which a soluble poisonous sulphate of lead remains in solution. Gin is fined also by a mixture of alum, carbonate of potash, almond oil, sulphuric acid, and alcohol, by which it acquires the property of "beading," or hanging in drops on the sides of the glass containing it. As diluting with water also reduces the strength and sweetness of the gin, the latter quality is restored by the introduction of sugar, and the former factitiously by adding the peppery flavored grains of paradise or cayenne in the form of tincture of capsicum. Sulphate of zinc (white vitriol) is sometimes employed for the same purpose. The pure Holland gin is subject to similar adulterations.

GINGER, the root of the *zinziber officinale*, a shrub which was first known in Asia, but is now cultivated in the West Indies and Sierra Leone. The stem grows to the height of 3 or 4 feet, and dies annually; the root continues two years. It is dug when one year old, and in the West Indies usually in January and February after the stems have withered. Two varieties are distinguished, called the black and the white ginger; the difference appears to be owing to the greater care exercised in the selection and preparation of the roots of the latter. After being washed, the outer coating or epidermis is scraped off, and the roots are then scalded to prevent germination; they are finally dried in the sun, and are ready for market. The West India or Jamaica ginger, when carried to England, is sometimes further whitened by bleaching with chloride of lime, or the fumes of burning sulphur. The black ginger is not scraped, and the roots are not so well selected. Most of that which is imported from the East Indies is of this character, and such is the article in common use in the United States. Though called black, the color of the powdered root is a light yellowish

brown; that of the white ginger, as imported from Liverpool, is a yellowish white. The young and tender roots are often selected for preserved ginger. This is prepared by removing the epidermis and boiling in sirup. The best ginger is hot and biting to the taste and of aromatic odor; the common article is less decided in these qualities, and by exposure to the air either kind loses them entirely. They may be extracted by water and alcohol. The taste appears to be due to a volatile oil of yellow color, that exists in small proportion in the root, and the aromatic quality to a soft resin. Ginger is employed as an ingredient in various domestic preparations, as beer, sweet bread, &c. Its effect is stimulative, warming, and soothing to the stomach, and for these qualities its use is introduced in medical practice. It is recommended as an excellent addition to bitter infusions and tonic powders. It is externally applied as a rubefacient; and while it excites a considerable degree of heat, it does not discolor or injuriously affect in the slightest degree the most delicate skin. Thus used, it is made into a thin paste with some alcoholic liquor and spread as a plaster. Commercial ginger is frequently adulterated, and is often more than half made up of foreign matters, as ground rice, wheat and potato flour, sago and tapioca. With these turmeric powder is used to preserve the color, and cayenne pepper and mustard are added to disguise the other substances and give factitious strength to the mixture. Of 21 samples examined by Dr. Hassall, 15 were found to be thus adulterated. Inferior qualities are made to resemble the best by bleaching and also by washing in chalk and water. Ginger thus prepared is said to be whitewashed.

GINSENG, the root of the annual shrub *panax quinquefolium*, the genus so named by Linnæus from *panacea*, with reference to the estimation in which the plant is held by the Chinese. The name of the plant among the Chinese and North American Indians very singularly signifies in their respective languages the figure of a man, given it from some fancied resemblance in the root to the human figure. Attention was first called to the plant early in the 18th century by the Jesuit missionaries, who found it in the highest estimation among the Chinese for its supposed medicinal virtues. The right of collecting the root was monopolized by the emperor, and whole districts containing the forests in which it was found were scrupulously guarded against the encroachments of any but the 10,000 Tartars employed by the emperor to collect the root. Each of these, in the year 1709, was bound to furnish 2 ounces free, and to sell the rest to the emperor for its weight in silver, which was not more than ¼ of its value. The article, indeed, was often rated at its weight in gold. Many volumes are said to have been written by the Chinese physicians upon the virtues of the ginseng. They introduced it in almost all their prescriptions for the nobility, with the view of restoring strength to the sick, and

increasing the vigor of the healthy. The root was used to make a decoction, and the leaves for an invigorating tea. The growth of the plant was found to be below the 89th and 47th degrees of latitude, and an account of it being brought to America, it was discovered first in Canada by Father Lafitau, a missionary among the Iroquois, and in 1718 a description of it was published in the "Memoirs" of the French academy. The French soon engaged in collecting and exporting it, and at one time it was impossible to hire the Indians about Montreal and Quebec for any other purpose than gathering this plant. Large profits were made by the early shipments; but the Chinese at last began to question the qualities of the American article, and its price accordingly depreciated. As late, however, as the year 1832, the shipments of ginseng from the United States amounted to 407,067 pounds, valued at \$99,308. The plant has been found in the mountainous portions of the states, in rich and shady woods, from Canada to Tennessee. The principal collections of it for shipment are now made in western Virginia, Pennsylvania, Ohio, Minnesota, and Wisconsin. In Richland co., western Wisconsin, the trade is stated to have amounted to \$40,000 in 1858, and has been estimated at \$80,000 in 1859. In Minnesota the collection of it was undertaken with great zeal in the early part of the year 1859, and immense quantities were sent to the east, although that gathered in the spring is considered far inferior to that gathered in the autumn. Attempts to cultivate it in gardens have proved unsuccessful. It is regarded in this country of no value as a medicine, and if found in the shops of the druggists it is only to supply the demand for its use as a masticatory, some people having a fondness for chewing it. The taste is rather agreeable, being sweet and bitter, and somewhat aromatic and pungent. Its decoction is a lubricating mucilage, with some degree of aromatic warmth. In the materia medica it is classed among demulcents, and resembles liquorice in taste and external qualities more than any other medicine.

GIOBERTI, VINCENZO, an Italian philosopher, priest, and statesman, born in Turin, April 5, 1801, died in Paris, Oct. 26, 1852. His family, originally of the French middle class, had long been established in Piedmont, and had suffered in commerce severe reverses of fortune. He lost his father in infancy, and the piety of his mother prompted him at an early age to choose the ecclesiastical profession. He studied at the university of Turin, received the degree of doctor of theology in 1823, and 2 years later was ordained to the priesthood. Becoming professor of theology at Turin, he spent several years in scholastic retirement, engaged in various studies of history and philosophy, especially in their relations to religion, and laid the foundation of his erudition, which was afterward unrivalled among his countrymen. Religion and patriotism were the twin motives with which he inspired his pupils. On the accession of

Charles Albert he was appointed court chaplain, but resigned the office in 1838. This step and the liberal tone of his university lectures made him suspected as an accomplice of the revolutionary schemes of "young Italy," and he was suddenly arrested. As, however, he had not coöperated with the secret societies, and had even formally refused to do so, he escaped with 4 months' imprisonment, followed by a sentence of banishment. The first year of his exile he spent in Paris, with the design of pursuing his studies of Christian, and especially Italian philosophy, and with the hope that the literary treasures in the reserved parts of the public libraries might be opened to him. In this he was disappointed, and forced by poverty he renounced or postponed his plans of authorship, and went to Brussels, where he was offered by a friend a humble position as teacher in a private school. In this office he remained 11 years. Meantime he obtained ample privileges in the public libraries of that city, resumed his interrupted studies, and produced his philosophical works, the *Teorica del sovrannaturale* (Brussels, 1838), and the *Introduzioni allo studio della filosofia* (3 vols., Brussels, 1840). The mastery displayed in the latter work at once of the highest problems of theology, philosophy, and history, its profound expositions and hostile criticisms of the principal modern philosophical systems, and its brilliant and novel subjection of science to revelation, and of all the culture of life to religion, caused him to be immediately recognized as one of the chiefs of Catholic philosophy. Abandoning the psychological method, which he called the great modern heresy in philosophy, he revived the theory of the ideal vision, "a most ancient doctrine, which sprang up at the origin of the race, was preserved in part by the philosophers of the Orient, was not ignored by Plato, was matured by the Alexandrians, was freed from all mixture with pantheism by the early Christian fathers, especially by St. Augustine, was professed by some illustrious realists of the middle age, and was at last exalted to the dignity of a scientific theorem by Malebranche." Endowed with this vision or super-intelligence, the human mind sees not only the archetypal ideas of things in the supreme mind, but also the creative act which individualizes them in time; communes not only with the speculative divine intellect, but with the practical divine will, and apprehends the miraculous work of creative omnipotence by being a constant spectator of the immanent act of creation. The key to all philosophy and to all knowledge is what he terms the ideal formula *L'Ente crea le esistentiæ* (*Ens creat existentias*: "Being, i. e. God, creates existences"). This formula, as the first, axiomatic, and universal truth, he restores to modern philosophy, and makes it the ontological basis of all dialectics, the *primum philosophicum*. It embraces the universe in the duality of the necessary and the contingent, binds these together by the link of the substantial creation, and reduces them to the primordial unity of a

Being, not abstract or generic, but concrete, individual, absolute, and creative. A substance or first cause, an organic multiplicity of substances or second causes, and a real and free act by virtue of which the creative God unites himself with the world of created existences, are the 3 integral ideal elements which constitute together the ideal organism. They are not only the basis of the whole created order, but reappear in special applications in every fact of nature and every act of human life, God universally entering as creator in the order of second causes. Thus in ethics the ideal formula is: "God, by means of the human will, produces the good," which may be resolved into the two corresponding formulas: "The will, by subjecting the passions to law, produces virtue," and "Virtue, by reconciling the passions with law, produces happiness." He recognizes two cosmic cycles, the one the procession of existences by way of creation from God as first cause, and the other the return of existences to God as final cause. All practical life, all manifestations of created activity, belong to this second cycle; and the absolute and universal law of God, who alone hath true and complete autonomy, directs this process of return, which by reason of sin has become a process of redemption. The law corresponds in the second cosmic cycle to the creative act in the first, and is the means of a moral cosmos, as the latter is of a physical cosmos. In the creative cycle, God is the only agent; in the moral cycle, man coöperates with the divine Actor, imitating him, and aiming to produce under his guidance his own uprightness and happiness. It was rather by the remarkably original form of its statements than by the novelty of its ideas that the *Introduzioni* exerted its influence, and caused Gioberti to be hailed as the reconstructor of modern philosophy. It was quoted with applause in the charges of French and Italian bishops, and, though assailed by a portion of the Catholic press, was examined, judged, and commended by Pope Gregory XVI. Eloquent, passionate, and full of bold and felicitous digressions, it contains more pages on literature, art, and especially politics, than on the philosophical theory which it introduces, and foreshadows the character of a publicist which the author was soon to assume. In his work *Del bello* (Brussels, 1841) he applied his philosophy to æsthetics, defining beauty to be "the individual union of an archetypal idea with a fantastic element made by the æsthetic imagination." In a fine criticism of the *Divina Commedia* he maintains its superiority to all other poems. The first work that made him popularly known was the *Del primato morale e civile degli Italiani* (Brussels, 1848), the object of which was to restore in Italy not only the philosophy of the Christian fathers but the Guelph policy of the papacy. As applied to human society, the ideal formula becomes: "Religion creates the morality and civilization of mankind." This he states to be a truth of universal history, the civil orders having always sprung from the sacerdotal,

cities from temples, laws from oracles, philosophy from theology, and popular culture from religion. Italy is the sacerdotal nation of Roman Catholic Europe, being elected by Providence to guard the second dispensation, as Israel was to guard the first. Hence her precocious mediæval civilization, when the popes exercised civil dictatorship over the monarchs. The rest of Europe being then barbarous, religion was obliged to give a large place to the ascetic and contemplative life, and to institutions of impressive splendor, fit to awe and soften the fierce men who beheld them. But in modern society, when the European nations have attained their majority, and the culture of the enlightened laity is equal to that of the clergy, the study of the latter should be to ally piety with the active life of man, with industry, letters, learning, and all the agencies and ornaments of civilization. He affirms that the priesthood has failed to recognize the changes which have been going on about it, the progress of civil and social culture, and that it has attempted to retain the people in tutelage beyond the proper time, after it has lost its control of them by having lost its former moral and intellectual superiority over them. Hence a fatal schism exists between the ecclesiastical and temporal orders, between spiritual and secular culture, which is the source of all the evils that afflict modern society. The remedy which he proposes is the voluntary cession by the priesthood of a dominion which has become incompatible with modern civilization, and a thorough alliance of sacerdotal and lay culture, a blending of the superhuman excellences of the gospel with the ancient spirit of Athens and Rome, an interfusion of Plato with Dante, Brutus with Michel Angelo, Cato with Hildebrand, and Lycurgus with Carlo Borromeo. He calls upon the Italians and the Italian clergy to inaugurate this new civilization, higher and more exquisite than any that the world has hitherto known, urging the latter to put themselves at the head of social movements, and to be the champions and not the enemies of the demands of the age for free institutions. Italy must renounce the ancient dictatorship, but he claims for the pope an arbitratorship in the affairs of the European nations, founded, however, only on his spiritual authority. By this policy, religion would harmoniously resume its place as the leading influence in society. The programme which he proposed for immediate Italian politics was: a confederation of the states; the introduction of reforms; a religious head, the pope; a military head, the king of Sardinia; a capital, Rome; a citadel, Turin; and above all, a sentiment of nationality in the Italian princes. From the publication of the *Primato*, Gioberti was regarded as the leader of the moderate liberal party; in spirit, aim, and practical tendency he was in sympathy with the party of "young Italy," from which he differed by including among the instruments for reconstructing society his ideal philosophy and the Catholic church. Few works have been re-

ceived with greater enthusiasm, or have wrought a greater influence upon the public opinion of a nation. It was, however, distrusted by the Jesuits, to whom Gioberti replied in the *Prolegomeni* of the second edition (Brussels, 1845). In 1846 he removed to Paris in order to be within reach of the movements of internal reform beginning in Italy. The accession to the pontifical see of Pius IX., who had studied with favor the writings of the exiled philosopher, and the liberal measures which he granted at the same time that constitutional principles were proclaimed by the court of Turin, promised to Gioberti the speedy realization of his ideal. He wrote a severe and passionate answer to the attacks which the Jesuits had made on him, under the title of *Il Gesuita moderno* (5 vols., Lausanne, 1847), the result of which was their expulsion from Sardinia. At the revolution of 1848 he returned to Italy after an absence of 15 years, and was welcomed with a triumph at Turin, the city being illuminated in his honor several nights in succession. Opposed alike to foreign dominion and to a general republic, his scheme was a union of the states under the supremacy of the house of Savoy, and he visited the principal cities of the peninsula, haranguing the troops, the universities, and the populace in favor of his views, and was everywhere received with enthusiasm. Mazzini, the head of "young Italy," was, however, his rival in popularity and influence, and his bitter opponent, and the discord between these two leaders soon extended to the princes, some of whom withdrew the forces which they had sent to aid Sardinia against Austria. Mazzini and Gioberti mutually reproached each other with being a greater enemy to Italy than even Austria. The latter, elected to the Piedmontese parliament (which assembled on May 8) by both Genoa and Turin, placed himself at the head of the constitutional royalist party in the chamber of deputies, and was appointed its president by acclamation. In July he entered the Casati ministry, and for a moment thought that he saw the triumph of his hopes in the vote by which the Lombardo-Venetian provinces were annexed to Sardinia. The military reverses experienced by Charles Albert quickly dissipated the illusion, and the ministry gave place to that of Revel, which accepted an armistice that resembled an abandonment of the war of independence, and therefore was at once unpopular. Gioberti united with his opponents of the extreme democratic party in efforts to overthrow this ministry, and at the same time resumed his idea of a political league, and became president of the society for an Italian confederation, representatives of which from all parts of Italy assembled in Turin on Oct. 10. His conduct won general admiration, even from "young Italy," and he was enthusiastically placed at the head of the cabinet which on Dec. 16 succeeded that of Revel. He had scarcely become master of his position, when he selected his own way of carrying out his views. Though he had announced a new campaign in Lombardy,

he was convinced that it could only be fruitless, and conceiving a sort of *coup d'état*, he broke with the party which had yielded to him and shared with him the ministry, absorbed in himself all the energy and responsibility of the cabinet, and, renouncing the war of independence, resolved to employ the Piedmontese armies in restoring the thrones of the peninsula which had been carried away by the popular commotions. He designed to surround them with constitutional guarantees, and to make them not less liberal than anti-republican. To carry back the pope and the exiled princes in the face of "young Italy," then triumphant at Rome, was a conception worthy of his political daring. Two obstacles prevented his beginning the execution of the plan: the refusal of the Italian princes to trust their restoration to the court of Turin, and the energetic resistance of the other Piedmontese ministers to such a movement. The king himself formally opposed the programme of the philosopher, who, after a remarkable discourse before the chambers, resigned his office on Feb. 21, 1849, declaring that with him had fallen the cause of Italian renovation. After the disaster of Novara (March 28), he entered the new cabinet as minister without a portfolio, and was soon after sent to Paris as plenipotentiary. The mission being hardly more than an honorable exile, he solicited the appointment of a successor, and retired from public life. He resumed his studies, and published his *Del rinnovamento civile d'Italia* (2 vols., Paris and Turin, 1851), in which he criticizes the conduct of parties in the movement of 1848, and affirms that he repents of no counsel which he gave or political act which he performed during his brief public career. The end of his efforts he states to have been "to establish in Italy a Piedmontese hegemony, and in Europe the moral supremacy of Italy." He resided from this time in Paris, and was engaged in a philosophical work on *Protologia*, or first science, when his death occurred suddenly by apoplexy. Gioberti is the subject of an able discussion in "Brownson's Quarterly Review" for Oct. 1850, in which, though the highest eulogy is bestowed on his genius, culture, and the first principles and method of his philosophy, he is criticized for aiming in his speculations, not at the salvation of the soul, but at the advancement of civilization, not at the eternal beatitude, but at the earthly felicity of men and the temporal well-being of nations; as maintaining Catholicity, but not maintaining it for a genuinely Catholic end. It is affirmed that religion, thus considered as a civilizing agent rather than as an instrument of salvation, ceases to be religion, becomes merely human, passes wholly into the secular order, and therefore necessarily loses all power or influence over it; and that from this primal error has sprung the attempt of Gioberti "to unite the world and God, earth and heaven, philosophy and theology, heathenism and Christianity, lay culture and sacerdotal." The attempt is regarded as inconsistent with his own principle that the priest-

hood creates civilization, which is therefore thought subject to religion, and not an independent, coexisting interest to be reconciled or harmonized with it. Gioberti refused to submit to the papal condemnation of his *Gesuita moderno*, and all his works have been placed on the index at Rome. Beside those already mentioned, he wrote letters in French *Sur les erreurs religieuses de M. de Lamennais* (Brussels, 1840), and *Sur les doctrines philosophiques et politiques de M. de Lamennais* (Brussels, 1842), and a treatise *Degli errori filosofici di Ant. Rosmini* (Brussels, 1841), charging both of these philosophers with tendencies to pantheism; *Del buono* (Brussels, 1848), in which he applies his philosophical system to ethics; *Apologia del libro intitolato Il Gesuita moderno* (Paris and Brussels, 1848), and *Operette politiche* (2 vols., Lugano, 1851). A uniform edition of his earlier works was published at Brussels (9 vols., 1848-'5). His posthumous works are now (1859) in process of publication at Paris and Turin, under the editorial care of G. Massari.

GIOJA, FLAVIO, also called GIRA or GIERI, a Neapolitan mariner, born in Pasitano near the end of the 18th century. The invention of the compass was long attributed to him; but the use of the magnetic needle, suspended by a thread, was known before his time, and he probably introduced the improvement of fixing the needle on a pivot.

GIOJA, MELCHIORE, an Italian political economist, born in Piacenza, Sept. 20, 1767, died in Milan, Jan. 2, 1829. He studied in his native city at the college Alberoni, particularly mathematics, philosophy, and theology, and received holy orders. He lived in studious retirement till the changes caused in Italy by the victories of Napoleon called him to public life. He declared himself for a republic, advocating the adoption of a constitution for Italy similar to that of 1795 in France. The institute of the Cisalpine republic having proposed the question: "Which of all free governments is the best for Italy?" he answered: "The republican," in a dissertation which obtained the prize. He was subsequently appointed historiographer of the state. His liberal views caused him a temporary imprisonment in 1799. Having lost his situation as historiographer by a treatise on divorce (1808), and been removed from the board of statistics on account of articles criticizing the management of public affairs, he revenged himself by a sarcastic article entitled *Il povero diavolo*, in consequence of which he was obliged to leave Italy. He was recalled in 1818, and intrusted with the elaboration of the statistics of Italy, which work was soon interrupted by the fall of that kingdom with the empire of Napoleon (1814). He then wrote on political, economical, and philosophical questions. Suspected of participation in the liberal movements of 1820, he was arrested by the Austrian government, but set free after 8 months' imprisonment, and continued his literary labors. He was a disciple of Bentham and Locke, and his numerous

works on political economy are among the most important in the Italian language.

GIORDANO, LUCA, an Italian painter, born in Naples in 1682, died in the same city, Jan. 12, 1705. He studied at first under Ribera, and afterward went to Rome and studied under Pietro da Cortona. He painted with unequalled rapidity; which circumstance, as well as the nickname of Fa Presto by which he was sometimes called, was perhaps due to the avarice of his father, an inferior artist, who in Luca's youth sold his works at a high price, and was continually urging him on with the words: *Luca, fa presto* ("Luca, make haste"). He visited Parma, Venice, Bologna, and Florence, leaving everywhere products of his talent and facility. Invited to Madrid by Charles II. in 1692, he remained in Spain 10 years, and executed an immense number of frescoes in the Escorial, and in the churches and palaces of Madrid, Toledo, &c. The skill with which he imitated the manner of other artists gained him the title of the Proteus of painting. Among the most admired of his numerous works are the "Triumph of the Church Militant" in the Escorial, the "Virgin and the Child Jesus" in the Pitti palace at Florence, and the "Judgment of Paris" in the Louvre.

GIORGIONE. See BARBARELLI, GIORGIO.

GIOTTO, called also GIOTTO DI BONDONE from his father, and by some AMBROGIOTTO, the regenerator of Italian art, born at Vespignano, near Florence, in 1276, died in the latter place about 1336. Tradition relates that the painter Cimabue discovered him, a shepherd boy in the valley of Vespignano, in the act of drawing upon a smooth piece of slate the figure of a sheep grazing near him, and was so struck with the genius which the work evinced, that he took him into his own house in Florence and taught him his art. Giotto, who was then about 14 years of age, more than realized the expectations of his master, whom he speedily excelled, and who undoubtedly in the latter part of his life conformed his style to that of his pupil. Art was then feebly struggling to free itself from the trammels of the constrained Byzantine style which pervaded all Italy. Cimabue and Duccio di Siena had indeed attempted to improve on existing models, but to Giotto must be ascribed the honor of giving the first healthful impulse to modern art by rejecting them altogether. He was essentially an innovator, and from the commencement of his career deviated from the practice of his predecessors, not merely in the introduction of natural scenes and expressions, and in the dramatic interest of his groups, but in the minor characteristics of form and color. The symbolic representation of a subject, according to conventional rules, had hitherto been the highest aim of the artist. Giotto first gave life to art by making his works truly reflect his own impressions of nature, and was thus enabled within the short compass of a single life to overthrow an existing style, and to form and perfect another, whose higher development was reserved

for a later age. From the remoteness of the epoch in which Giotto painted, it is not surprising that many of his works have perished; but from the specimens that remain and the traditions of those that are lost it is easy to account for the influence which he exerted over central Italy, from Padua to Naples. Social and political revolutions, the quality of the materials used, the effects of climate, and the vandalism of his own and of later times, have destroyed or hopelessly injured his choicest works. Some of them have been white-washed over, among them his portraits of Dante and other eminent citizens of Florence, one of his earliest works painted on the walls of the chapel of the Podesta, now the Bargello, or prison, in Florence, and which Mr. Richard H. Wilde and Mr. Bezzi brought to light in 1840. These are said by Vasari to be the first successful attempts at portraiture. The record of his life is not very clear, but it is certain that before the death of his master Cimabue his reputation was such that Pope Boniface VIII. summoned him to Rome, where he designed his famous mosaic of the *Navicella*, representing the disciples at sea in a tempest and Christ raising Peter from the waves. It is now in St. Peter's, but frequent restorations have left little of the original work beside the composition. We next hear of him at Padua, where about 1306 he executed in the chapel of the Madonna dell' Arena his series of paintings, 42 in number, representing the life of the Virgin. He here met his friend Dante, then exiled from Florence, to whose influence the allegorical tendency which these and many of his subsequent works exhibit is justly ascribed. An instance of this is afforded in the majestic figures of Poverty, Chastity, and Obedience, representing the 3 vows of the order of St. Francis, over whose tomb they are painted in the famous abbey church of the Franciscan order at Assisi, the repository of so many curious specimens of old Italian art. Thenceforth Giotto was actively employed in many parts of Italy. Popes and kings, cities and monasteries, and noble families without number, were emulous for the possession of his works. Robert of Naples entertained him honorably at his court, where he painted the sacraments for the Incoronata; and he is even said to have followed Clement V. to Avignon, and to have painted there and elsewhere in France. The wonder and enthusiasm which his works excited are perhaps without a parallel in the history of Italian art. It seemed little less than miraculous that an artist should express natural character and emotion in his paintings, and a contemporary writer naively illustrates the feeling of the time by expressing his surprise that in Giotto's pictures "the personages who are in grief look melancholy, and those who are joyous look gay." Boccaccio says that "through Giotto that art was restored to light which had been for many centuries buried." Giotto cultivated also the arts of sculpture and architecture, and excelled in

each. Of his proficiency in the latter the famous Campanile of Florence, erected in 1334 from his designs, is a remarkable instance. His school flourished for upward of a century after his death.

GIOVIO, PAOLO (PAULO JOVIUS), an Italian Latin historian, born in Como, April 19, 1488, died in Florence, Dec. 11, 1552. He studied at Pavia, abandoned medical for historical inquiries, was protected by Popes Leo X. and Clement VII., by Charles V. and Francis I., wielded a venal pen, was loaded with honors and favors, and having lost all that he possessed when in 1527 Rome was sacked by the constable of Bourbon, was rewarded with the bishopric of Nocera. His veracity is not to be relied on. His most important work is a "History of his own Time" in 45 books, 6 of which are wanting.

GIRAFFE. See CAMELOPARD.

GIRALDUS CAMBRENSIS. See BARRY, GERALD.

GIRARD, CHARLES, an American naturalist, born in Mulhouse, France, in 1822. In 1839 he was a pupil of Agassiz, at Neuchâtel, Switzerland, and soon became one of his assistants. While in Switzerland he devoted himself chiefly to the *Nomenclator Zoologicus* and the *Bibliographia Zoologica et Palæontologia*. He accompanied Agassiz to America, and remained his assistant until 1850, in which year he went to Washington, where he has continued to reside. He has published in the "Smithsonian Contributions to Knowledge" the first of a series of monographs, being "Contributions to the Natural History of the Fresh Water Fishes of North America." A memoir of his on the "Embryonic Development of *Planocera Elliptica*" has appeared in the "Journal of the Academy of Natural Sciences" of Philadelphia. The article on reptiles in Stansbury's "Expedition to the Valley of the Great Salt Lake of Utah" is from his pen; also the article on fishes in Sitgreaves' "Explorations of the Zuni and Colorado Rivers;" fishes and reptiles in Marcy's "Exploration of the Red River of Louisiana;" fishes, reptiles, and crustacea, in Gilliss's "Expedition to Chile." The fishes of the United States and Mexican boundary report were described by him; also the fishes in the various Pacific railroad surveys, a large quarto with numerous plates. His "Ichthyological Notices" close, for the present, his labors on fishes. He was associated with Prof. Baird in the investigation of the reptiles in the museum of the Smithsonian institution; he also described the reptiles brought home by the U. S. exploring expedition, his volume being the 20th in the series, and accompanied with a splendid atlas. Various papers of his are published in the "Proceedings of the American Association for the Advancement of Science," in the "Proceedings of the Boston Society of Natural History," and in those of the academy of natural sciences of Philadelphia. A paper on the "Physical Aspects of Life" in the "Proceedings of the National Institute," opens a new field of physio-



logical inquiries, with their application to medicine.

GIRARD, GRÉGOIRE, known as Father Girard, a Swiss educator, born in Freyburg, Dec. 17, 1765, died in the same city, March 6, 1850. After receiving holy orders in 1790, he became curate in his native town, and teacher of philosophy in the Franciscan convent. In 1799, having presented to Stapfer, the minister of art and science of the Helvetic republic, a "Scheme for the Education of Switzerland," he was called to aid in organizing a system of general education. After a short stay at Bern, Father Girard returned in 1805 to Freyburg, where he had been appointed prefect of the primary school. Here he was at liberty to reduce to practice his own ideas, and his school flourished till his fame as an instructor spread over Europe. His aim was to convey moral and religious impressions with every exercise of the memory and reason. Through the influence of the Jesuits after their return to Freyburg, the bishop was persuaded in 1823 to abandon his system and suppress his school. He retired to Lucerne, where he taught philosophy with great success. He returned again to Freyburg in 1835 to complete his *Cours éducatif de langue maternelle, à l'usage des écoles et des familles*, the 1st volume of which had already been rewarded by the French institute with the Montyon prize, and the whole appeared at Paris (3 vols., 1845-'8).

GIRARD, STEPHEN, an American merchant and banker, born near Bordeaux, France, May 21, 1750, died in Philadelphia, Dec. 26, 1831. He was the son of a seaman, and following his father's calling sailed about 1760 in the capacity of cabin boy to the West Indies and New York. Rising by degrees to be master and part owner of an American coasting vessel, he accumulated in the course of a few years a sum sufficient to establish him in business as a small trader in Philadelphia in 1769. He married about this time the daughter of a ship builder of that city, but the union was unhappy. Mr. Girard applied for a divorce, and his wife ultimately died insane in a public hospital. Meanwhile Girard trafficked with the West Indies with variable success, until his maritime ventures were suspended by the war of the revolution. He then opened a grocery and liquor shop, at first in Philadelphia, and afterward, during the British occupation of that city, at Mount Holly, where he drove a profitable trade with the American soldiers. In 1780 he resumed his dealings with the West Indies and New Orleans, and some time afterward was in partnership for a few years with his brother John. The connection was dissolved in 1790, Stephen having gained while it lasted about \$30,000. The foundation of his subsequent wealth, however, seems to have been a lease which he took of a range of stores, at a time when rents were much depressed by the war; these he underrented at a large profit. Another source of gain to him was the negro insurrection in St. Domingo. Two of his vessels were

then in one of the ports of the island, and many of the planters placed their treasures in them for safety, but were afterward cut off with their entire families. About \$50,000 worth of property whose owners could not be found thus remained in Mr. Girard's hands. With a remarkable capacity for business and a habit of strictness in money matters, he rapidly multiplied his wealth, and before long came to be recognized as one of the richest merchants in the city. During the prevalence of the yellow fever in Philadelphia in 1793, '7, and '8, when it raged with a violence never before seen in America, Mr. Girard not only made liberal donations of money, but performed in person the duties of physician and nurse, undertook the most disagreeable offices in the hospitals, and for two months kept charge of the hospital on Bush hill. In 1812, having purchased the building and a large part of the stock of the old United States bank, he commenced business as a private banker, with a capital of \$1,200,000, which was afterward increased to \$4,000,000. Beside the benefit which this institution proved to the national currency, it enabled Mr. Girard to make heavy loans to the government in times of public embarrassment; and at one period, during the war of 1812, when out of a loan of \$5,000,000 proposed by the secretary of the treasury only \$20,000 could be negotiated, he subscribed for the whole amount. He had an active agency in procuring the charter of the second United States bank, of which he became a director. He contributed liberally to all public improvements, and adorned the city of Philadelphia with many handsome buildings. His character was a remarkable compound of apparently conflicting qualities. He was frugal and parsimonious, but not avaricious; profuse in his public charities, but stern in exacting the last fraction that was due him. His kindness to sick persons was extraordinary, but he never had a friend. His appearance was very plain. He was uneducated; was a free thinker in religion, and an admirer of the school of Voltaire and Rousseau, after whom he was fond of naming his ships. His property at the time of his death amounted to about \$9,000,000. Comparatively little of it was bequeathed to his relatives. To the Pennsylvania hospital he willed \$30,000; to the Pennsylvania institution for the deaf and dumb, \$20,000; to the orphan asylum of Philadelphia, \$10,000; to the Philadelphia public schools, \$10,000; to the city of Philadelphia, for the distribution of fuel to the poor every winter, \$10,000; to the society for the relief of distressed masters of ships, \$10,000; to the masonic loan, \$20,000; to the city of New Orleans, a large amount of real estate; to the city of Philadelphia, for improvement of its streets, buildings, &c., \$500,000; for the improvement of canal navigation in Pennsylvania, \$300,000. The principal bequest, however, was the sum of \$2,000,000, beside the residue of a certain portion of his estate out of which some legacies were to be paid, together with a plot of ground in Phil-

adelphia, for the erection and support of a college for orphans. The most minute directions were given for the construction, size, and materials of the building, which was accordingly begun in July, 1833, and opened Jan. 1, 1848. It is surrounded by a stone wall 10 feet high, enclosing 41 acres of land laid out in play grounds, grass plots, gardens, &c. The main building is the finest specimen of Grecian architecture in America, and is even said to be the finest of modern times. The outer walls, stair cases, floors, and roof are of white marble; the inner walls of brick. It is in the form of a Corinthian temple, surrounded by a portico of 84 columns, each 55 feet high and 6 feet in diameter. Its length is 169 feet, its width 111 feet, and its height 97 feet. The entrances are on the N. and S. fronts, each door being 16 feet wide and 82 feet high; the E. and W. sides are pierced each by 24 windows. The structure rests on a basement of 11 steps extending around the entire building. A marble statue in the lower vestibule covers the remains of Mr. Girard. There are 5 other buildings within the enclosure, one of which is used as a laboratory, bakery, wash house, &c. The other 4 stand 2 on each side of the main building, and are of marble, each 2 stories high, 125 feet long, and 52 feet wide. The cost of the edifices was over \$1,930,000. As many poor white male orphans as the endowment can support are admitted between the ages of 6 and 10 years, fed, clothed, and educated, and between the ages of 14 and 18 are bound out to mechanical, agricultural, or commercial occupations. By a provision of the will of the founder no ecclesiastic, missionary, or minister of any sect whatever is to hold any connection with the college, or be admitted to the premises even as a visitor, but the officers of the institution are required to instruct the pupils in the purest principles of morality, and leave them to adopt their own religious opinions on their entrance into life. The officers consist of a president, secretary, 2 professors, 5 male and 12 female teachers, a physician, a matron, an assistant matron, and a steward.

GIRARDIN, DELPHINE GAY, a French authoress, wife of the succeeding, born in Aix la Chapelle, Jan. 26, 1804, died in Paris, June 29, 1855. She was the daughter of Mme. Sophie Gay, and a poem written by her when she was scarcely 18 years old gained an extraordinary prize of the French academy. In 1824 she published a collection of *Essais poétiques*. She was accustomed to recite her verses in society, and having extemporized some beautiful lines on the premature death of Gen. Foy in 1825, she was hailed as *la muse de la patrie*, and received from Charles X. a pension of 1,500 francs. On a visit to Italy in 1827 she was elected by acclamation a member of the Tiber academy at Rome, and carried in triumph to the capitol. She married Emile de Girardin in 1831, and produced in 1833 *Napoli*, one of her most charming poems. She had already begun to write novels. *Le lorgnon*, which appeared in 1831, was succeeded

by *M. le marquis de Pontanges* in 1835, and *La canne de M. de Balzac* in 1836. From 1836 to 1848 she furnished to the *Presse*, under the nom de plume of Vicomte Delaunay, 57 *Lettres Parisiennes* on matters of literature, art, and fashion. The only complete edition of these letters was brought out in 1858, with an introduction by Théophile Gautier. In 1839 she wrote a comedy, *L'école des journalistes*, the representation of which was prohibited by the government. In 1843 her tragedy *Judith*, designed for Rachel, was performed at the *théâtre Français*. Another tragedy, *Cléopâtre* (1847), and the comedy of *Lady Tartuffe* (1853), were also written for that actress. Her comedies, *C'est la faute du mari, ou les bons maris font les bonnes femmes* (1851), and *La joie fait peur* (1854), and her vaudeville *Le chapeau d'un horloger* (1854), were highly successful. Her last novels, *Marquise, ou deux amours*, and *Il ne faut pas jouer avec la douleur*, appeared in 1858, and a new edition of the former in 1858. She was celebrated for her beauty and wit, and her drawing room was frequented by men of letters.

GIRARDIN, EMILE DE, a French journalist, born in Switzerland in 1802. The natural son of Count Alexandre de Girardin, registered at his birth under the fictitious name of Emile de Lamothe, he struggled for years before he gained his right name, and it was not till 1837 that his filiation was definitely established by his parents' public avowal. After being inspector of the fine arts under the Martignac ministry, he established two periodicals: *Le voleur*, which pilfered from all the other journals, and *La mode*, a journal of fashion, which enjoyed the patronage of the duchess of Berry. After the revolution of 1830 he established the monthly *Journal des connaissances utiles*, the price of which was only 4 francs (less than 80 cents) a year, which soon obtained the unprecedented number of 120,000 subscribers. Through the agency of this paper, he organized a subscription for the establishment of a model farm, known as the *Institut agricole de Coslbo*, and greatly contributed to increase the number of savings banks through the country. He issued other cheap publications in connection with his monthly, as the *Journal des instituteurs*, at 86 cents a year; a geographical atlas at one cent a map; the *Almanach de France*, at 10 cents a copy; the *Journal des gardes nationales*, and the *Gastronome*, a culinary paper which was found in every eating house and restaurant. He was one of the founders of the illustrated weekly *Musée des familles*, which is still prosperous. In 1835 he projected the *Panthéon littéraire*, a series of 100 large vols. 8vo., which were to embrace a mass of letterpress equal to 1,000 ordinary volumes, and to present in a cheap form the standard works of every country. In 1836 he established the *Presse*, a political daily paper, at a yearly subscription of 40 francs, half the price before paid for such journals. This attempt brought upon him the wrath of nearly all his contemporaries. Both his public and

private life were assailed; he was charged with claiming a name which was denied him, with dishonesty in some of his numerous business transactions, and with unscrupulous ambition in his political course. Having challenged Armand Carrel, and killed that popular journalist in the duel, the clamor against him increased on all sides. He however was undaunted, and succeeded in securing the full possession of his name and a long disputed seat in the chamber of deputies, while he extended the circulation of the *Presse* so as to place it beyond rivalry. His character appeared in his motto: *Une idée par jour*. He supported the Molé ministry against the coalition in 1839, and the ministry of Guizot during most of its duration. In 1846 he was excluded from the chamber of deputies on the ground that he was not a Frenchman. In 1848 he refused to participate in the reform banquets which preceded the revolution. On Feb. 24, during the insurrection, he presented himself at the Tuileries and persuaded the king to an abdication in favor of his grandson, the count of Paris; but it was too late to save the dynasty. He vigorously supported the new order of things, tried to inspire the French people with confidence in it, and became for a while the most popular journalist in Paris. During a few weeks nearly 150,000 copies of the *Presse* were disposed of daily. His independent politics, however, were deemed dangerous by Gen. Cavaignac, who ordered his arrest after the insurrection of June, and kept him 11 days in strict confinement. On resuming the editorship of his journal, Girardin vehemently attacked the rule of the general, and greatly contributed to the election of Louis Napoleon to the presidency, but soon became his opponent, gave his journal a more and more radical and socialistic turn, and after the *coup d'état* of Dec. 2, 1851, was ordered out of France. He afterward returned, but, unable to submit to the restrictions on journalism, sold his share in the *Presse* in 1856 for nearly a million of francs. Although now apparently unconcerned in politics, he is reported to be the secret adviser of Prince Napoleon. The catalogue of his political pamphlets would fill columns; most of them are of a decidedly democratic character. His contributions to the *Presse* from 1836 to 1856 were published in 1858 (12 vols. 8vo.), under the title of *Questions de mon temps*. After the death of his first wife, he married (Nov. 1856) Mlle. Mina de Tieffenbach, daughter of a former Viennese postmaster, who was raised to the rank of countess by the duke of Nassau. In 1859 he furnished an introductory preface to a work entitled *Les départs célèbres*, by A. Oharguéraud.

GIRARDIN, MARC, or, as he signs himself, ST. MARC, a French scholar and journalist, born in Paris in 1801. After completing a successful course of classical studies at the college of Henry IV., in 1828 he competed for a professorship in the university, and brilliantly won the title of *agrégé*, but, on account of his liberal opinions, was not appointed to a chair until 1827. In the

latter year the French academy awarded a prize to his *Éloge de Bossuet*, and he became one of the political contributors to the *Journal des débats*. In 1828 his *Tableaux de la littérature Française au 16<sup>e</sup> siècle* was rewarded by another academical prize, which confirmed his reputation as an elegant, witty, and forcible writer and professor. In 1830 he travelled through northern Germany, and during a stay of 8 months in Berlin held friendly intercourse with Gans and Hegel. On his return he was appointed to succeed M. Guizot as professor of history in the faculty of letters, and named master of requests to the council of state. In 1833 he visited southern Germany as far as Vienna; and in 1834 published, under the title of *Notices*, the results of his two journeys beyond the Rhine. He was then called to the professorship of French poetry at the Sorbonne, and elected to the chamber of deputies. His report upon the organization of secondary instruction, presented in 1837, was highly valued; and he took rank among the most useful representatives. He entered at the same time the council of state and the council of public instruction; as a member of the latter board he greatly contributed to the extension and improvement of the system of historical teaching in the French colleges. In 1844 he was elected to the French academy. In 1848 he was designated as minister of public instruction, in the last cabinet attempted to be formed under the monarchy. Since that time he has held his position in the council of public instruction, and at the Sorbonne; he is also still a contributor to the *Débats*, and has lost nothing of his vivacity either as a journalist or as a lecturer. His principal works are his *Cours de littérature dramatique, ou de l'usage des passions dans le drame*, an improved reproduction of his lectures; his *Essais de littérature et de morale*; and his *Souvenirs et voyages*, comprising the notices upon Germany above alluded to.

GIRARDON, FRANÇOIS, a French sculptor, born in Troyes, March 16, 1628, died in 1715. He was furnished by Chancellor Seguier with the means of studying his art in Paris and Italy. He was patronized by Colbert, and received orders from the king for groups and statues in several of the royal palaces and gardens. He was appointed general inspector of sculpture in 1690 to succeed Lebrun. Some of his most celebrated works were destroyed during the revolution. The most important of those that remain are Richelieu's mausoleum in the chapel at the Sorbonne, and his groups of the "Bath of Apollo" and the "Rape of Proserpine" in the Versailles garden.

GIRDLE, a band or belt worn around the waist, usually to confine flowing garments. It was thus in use among the Greeks and Romans, and is still a part of ordinary oriental costume. The cestus or embroidered girdle of Venus and the bridal girdle (*zona virginea*) are celebrated in the classical poets. The ancient Britons used to put girdles marked with several mystical figures about the waist of women in labor,

which they imagined gave immediate and effectual relief. Such girdles were preserved with care till a comparatively late period in the highlands of Scotland. It was also an old English custom for an insolvent person to put off and surrender his girdle in open court, which arose from the practice of carrying the purse attached to it.

**GIRGENTI**, a province on the S. W. coast of Sicily, about 84 m. long and 22 broad; area, 1,200 sq. m.; pop. 250,000. Its surface is mountainous, with numerous valleys, which are exuberantly fertile, and yield corn, wine, and oil in great abundance. There is good pasturage, and the cheese made here is excellent. The chief mineral productions are bitumen, naphtha, sulphur, and salt. The province is divided into 3 districts, Girgenti, Bivona, and Sciacca.—**GIRGENTI**, the capital of the province, is 58 m. S. S. E. of Palermo. (See *AGRIGENTUM*.)

**GIRODET-TRIOSON**, ANNE LOUIS (**GIRODET DE ROUSSY**), a French painter, born in Montargis, Feb. 5, 1767, died in Paris, Dec. 9, 1824. He was a pupil of David, and obtained the great prize, which enabled him to go to Rome in 1789. During a residence of 5 years in Italy he sent to Paris the "Sleeping Endymion" and "Hippocrates declining the Gifts of Artaxerxes." On his return to Paris in 1795, he painted portraits of Chateaubriand and Queen Hortense, and several large pictures, as "Danaë," the "Seasons" for the king of Spain, "Fingal, Ossian, and their Descendants welcoming to their Aërial Palace the Manes of French Heroes," and in 1806 his most esteemed work, "A Scene of the Deluge." In 1808 he completed his "Funeral of Atala," in 1810 his "Revolt at Cairo," and in 1819 his "Pygmalion and Galatea." He was an accomplished classical scholar, and left 2 vols. of literary remains.

**GIRONDE**, a maritime department of France, formerly a part of the province of Guienne, bounded N. by Charente-Inférieure, E. by Dordogne and Lot-et-Garonne, S. by Landes, and W. by the bay of Biscay; area, 3,761 sq. m.; pop. in 1856, 640,757. The surface is almost entirely level, the W. portion being a vast, sandy, arid flat, collectively called the Landes. The chief rivers are the Garonne and Dordogne, which unite to form the Gironde, the Isle, Dronne, Dropt, and Leyre. The climate is temperate, and, except in the Landes, generally healthy. The principal productions are wheat, rye, millet, maize, hemp, fruit, wine, cork, charcoal, turpentine, pitch, and timber. Wine is however the staple product, 55,000,000 gallons being made annually. The most renowned Bordeaux wines are produced in the Gironde. Building stone, salt, and chalk are the principal mineral products. The manufactures include, beside wine, calicoes, muslin, earthenware, paper, leather, glass, tobacco, brandy, beer, vinegar, salt, chemicals, and cordage. Ship-building is extensively carried on in Bordeaux. There are 4 lines of railway, connecting Bordeaux with Paris, Bayonne, &c. Gironde is di-

vided into 6 arrondissements, Bordeaux, Blaye, Lesparre, Libourne, Bazas, and La Réole, which are subdivided into 48 cantons and 544 communes. Capital, Bordeaux.

**GIRONDISTS** (Fr. *Girondins*), a French political party, which played a conspicuous part in the legislative assembly and the convention. They derived their name from the deputies of the department of Gironde, whom they acknowledged as their leaders. Vergniaud, Gensonné, Guadet, Brissot (from whom they were sometimes styled *Brissotins*), Ducois, Boyer-Fonfrède, Louvet, Pétion, Valazé, Buzot, Barbaroux, Carra, Isnard, Lanjuinais, Condorcet, and Rabaut St. Étienne were the most renowned among their members. Imbued with republican principles, fond of justice and moderation, they enthusiastically promoted the proclamation of the republic (Sept. 1792), but engaged in a deadly struggle against the ultra revolutionary party, called the Montagnards; and although eloquence, talent, and virtue were mostly on their side, they succumbed to the violent assaults of their opponents after having been driven by the current to vote in part and reluctantly for the death of Louis XVI. The Montagnards charged them emphatically with plotting against the unity of the republic and aiming at a federal organization of the country. Twenty-two of them were arrested, June 2, 1793, incarcerated at the Conciergerie, and on Oct. 31 died on the scaffold. Mme. Roland, their inspirer, and her husband followed them soon after (Nov.), the former dying by the guillotine, the latter by his own hand. The other Girondist leaders escaped from Paris, and after vainly attempting to revolutionize several departments, almost all were either taken prisoners and beheaded, or died by their own hands. (See Lamartine, *Histoire des Girondins*, 8 vols., Paris, 1847.)

**GISORS** (anc. *Gisorium*, *Gisortia*, *Gisortium*, *Casarotium*), a town of France, department of Eure, in a fertile plain on the banks of the Epte, 83 m. E. S. E. of Rouen; pop. 3,597. It is surrounded by gardens and beautiful promenades formed upon the remains of its ancient ramparts. Its castle, most of which is still standing, was a work of great strength, and one of the chief fortresses of Normandy. It was built about the 11th century, but the donjon, an enclosed octagonal structure crowning a high artificial mound, was constructed in the 12th century by Henry II. of England. Under one of the towers is a dungeon, the walls of which are covered with carvings executed with a nail by some unknown prisoner. The parish church is an interesting edifice, presenting a singular combination of styles, and filled with grotesque sculptures. The choir is said to have been built by Blanche of Castile in the 13th century.

**GITITH**, a word occurring 8 times in the titles of the Psalms (viii., lxxxi., lxxxiv.), and generally supposed to designate a musical instrument. It does not, however, occur in any list of instruments. Gesenius supposed that it was a general name for stringed instruments,

and Carpozov, Pfeiffer, and others, that the songs with this title were sung during the vintage. Redslob has published a treatise on the subject, *De Voce מרים* (Leipsic, 1881).

GIULIO ROMANO, an Italian painter, whose family name was *Perri*, born in Rome in 1492, died in Mantua in 1546. He was the most distinguished pupil of Raphael, whom he assisted in many of his paintings, and who made him his chief heir and appointed him to complete his unfinished works. After the death of his master, Leo X. and Clement VII. employed him, together with Gian Penni, to finish the history of Constantine in the Vatican, and he executed several works for the public edifices at Rome, was also employed there as architect, and painted his celebrated picture of the "Stoning of St. Stephen" for the church of San Stefano at Genoa. He was afterward invited to Mantua, and engaged both as architect and painter on the Palazzo del Te. The "Defeat of the Titans," in one of the halls of the palace, is one of the best examples of his energetic and often extravagant style. He worked with his pupils on many other edifices at Mantua, and just before his death was appointed to succeed Sansovino as the architect of St. Peter's.

GIURGEWO, a town and river port of Wallachia, on the left bank of the Danube, opposite Rustchuk, and 48 m. S. S. W. of Bucharest; pop. 10,000. Its citadel, the only one of its fortifications remaining, stands on an island in the Danube called Slobotzin, and is connected with the town by a bridge. It is the most important port on the Wallachian bank of the Danube, and carries on a considerable trade with Germany and Hungary. The average annual value of its imports from these countries amounts to £275,000. It was several times captured and recaptured by the Russians and Turks in their various wars, and also in 1853 and 1854. It was garrisoned in 1855 by Turkish and Austrian troops.

GIZZARD. See COMPARATIVE ANATOMY, vol. v. p. 566.

GLACIER (Fr. *glace*, ice), a vast body of ice, filling some alpine valley, down which it slowly moves—the outlet of the snows which accumulate in the elevated portions of the mountain group. Glaciers may be found in all countries where there are extensive tracts of land lying above the level of the snow line of the region. In such localities the snows are ever accumulating, and the temperature not rising sufficiently for any considerable proportion to be melted and flow down, they fill the spaces between the summits, and form what in Switzerland are called *mers de glace*, seas of ice. By the pressure exerted by these vast collections the yielding material is forced through whatever opening is presented for its passage, and the great valleys leading to the base of the mountains are packed full of the solid ice, which results from the snow being solidified by pressure, or by its own melting and freezing again. This, solid as it appears, cannot resist the

accumulative force behind it, but is steadily though imperceptibly urged onward, conforming to all the irregularities of its channel, split sometimes by immovable ledges of rock, which stand like islands in its course, yet closing again below them with no trace of the fissure. These bodies of ice extend down the valleys till they reach a region where the temperature is sufficiently elevated to melt away the supplies as they arrive. Though these have gradually diminished toward the lower extremity of the glacier, so that this has flattened away somewhat like a wedge, and has also become narrower, the termination is frequently abrupt and even inaccessible. It presents an apparently stationary wall of ice, which, though seen to be constantly wasting, may yet by observations continued several days be found steadily advancing still further from the mountain. During the summer, currents of water formed from superficial thaws flow over its surface, at least in the daytime, and fall in cascades into the chasms, which are met with in great numbers extending across the glacier. They continue their course, hollowing out through the lower layers of the ice arched channels, which at the lower end appear like dark caverns extending far up into the icy mass. In high arctic latitudes, where the line of perpetual snow comes down to the sea level, the phenomena of glaciers are displayed upon the grandest scale. Thus they were seen in lat. 79°–80° by Dr. Kane in 1855, spreading over the western coast of Greenland, and sloping so gently toward the water that the effect of an inclined plane was perceived only by looking far into the interior toward the east. In this long range the angle of the slope was from 7° to 15°. Yet the whole icy crust of this portion of the continent was always advancing and stretching itself out into the western bay, where masses of it were constantly detached and floated off as icebergs. From this glacier to the southern extremity of Greenland, a distance exceeding 1,200 miles, Dr. Kane imagines a deep unbroken sea of ice may extend along the central portions nearly the whole length of the continent—a sea "that gathers perennial increase from the water-shed of vast snow-covered mountains and all the precipitations of the atmosphere upon its own surface. Imagine this, moving onward like a great glacial river, seeking outlets at every fiord and valley, rolling icy cataracts into the Atlantic and Greenland seas, and having at last reached the northern limit of the land that has borne it up, pouring out a mighty frozen torrent into unknown arctic space. It is thus, and only thus, that we must form a just conception of a phenomenon like this great glacier. I had looked in my own mind for such an appearance, should I ever be fortunate enough to reach the northern coast of Greenland; but, now that it was before me, I could hardly realize it. I had recognized, in my quiet library at home, the beautiful analogies which Forbes and Struder have developed between the glacier and

the river; but I could not comprehend at first this complete substitution of ice for water. It was slowly that the conviction dawned on me, that I was looking upon the counterpart of the great river system of arctic Asia and America. Yet here were no water feeders from the south. Every particle of moisture had its origin within the polar circle, and had been converted into ice. There were no vast alluvions, no forest or animal traces borne down by liquid torrents. Here was a plastic, moving, semi-solid mass, obliterating life, swallowing rocks and islands, and ploughing its way with irresistible march through the crust of an investing sea." ("Arctic Explorations," vol. i. p. 226.)—The phenomenon of glaciers reaching the sea and becoming icebergs was noticed by Darwin on the western coast of South America, even so near the equator as lat.  $46^{\circ} 40' S.$ , in the gulf of Penas, Chili. In northern Europe it has been observed in Norway, in lat.  $67^{\circ} N.$  Upon the Himalaya mountains the glaciers appear from the accounts of modern travellers to be exhibited in masses of stupendous height, as well as of vast extent. In the "Himalayan Journals" of Dr. Joseph Hooker, those of the eastern portion of the range, in the territories of Sikkim and Nepal, are described in detail, and mention is made of one which presents a vertical height of 14,000 feet, the source of which is the great Kinchinjunga, whose summit reaches the elevation of 28,178 feet above the sea. Other gigantic glaciers in the central Himalaya are described by Dr. Thomas Thomson ("Western Himalaya and Tibet"), and by Col. Madden and Capt. Richard Strachey, in the "Asiatic Researches," vol. xiv. Iceland, Spitzbergen, the Caucasus, and Altai have their glaciers, which have been described by travellers; but no regions have afforded such convenient opportunities for studying them in detail as the Alps of Switzerland, Savoy, Piedmont, and the Tyrol. Here, in the heart of central Europe, they are found covering in detached portions an aggregate area computed at about 1,484 sq. m. Between Mont Blanc and the borders of the Tyrol there are reckoned as many as 400, of which the greater number are between 10 and 20 miles in length, and from 1 to  $2\frac{1}{2}$  miles in breadth. Their vertical thickness is in many places rated at 600 feet; their range is from above the snow line, which is from 7,500 to 8,000 feet above the sea, down to the level of 8,000 to 8,500 feet, thus comprising a vertical descent of from 4,000 to 5,000 feet. Lateral ravines have their glaciers, which join as branches the ice-currents of the great valleys. This interesting region has long attracted the attention of scientific observers. It was studied by De Saussure in the latter portion of the last century, and his views were published in his *Voyages dans les Alpes*. De Charpentier is distinguished among later explorers as the able advocate of the theory explaining the motion of the glaciers, afterward sustained by Agassiz in his great work, *Études sur les glaciers*; and

Prof. James D. Forbes of Edinburgh published in 1843 his "Travels in the Alps," &c., with observations on the phenomena of glaciers made in visits to them repeated in 10 different summers, in which he crossed the principal chain 27 times by 23 different passes. To these might be added the names of many other distinguished naturalists, who have aided not only to develop the true nature of glaciers, but also to apply the phenomena they exhibit to the explanation of past changes upon the earth's surface.—Before presenting some of the results of these investigations, there are other features of interest about glaciers, beside those already pointed out, which should receive attention. As they lie spread over the broad valleys, they appear as fixed and immovable as the rocky cliffs at their sides. The snow which covers them during the winter disappears from their face in the warm days of summer, and thousands of streams are then produced which waste their material; but with the return of winter the covering of snow is renewed, and no change may be perceived in the great mass except such as can be referred to these superficial causes. By comparative observations only, made at different times, is it perceived that the great mass itself moves; and yet there are several circumstances that render this conclusion inevitable to the intelligent observer. The constant renewal of the waste at the lower extremity, already referred to, is one evidence of this. Objects upon the surface, too, are found to be continually moving down, even when their position upon the ice itself is not changed. From the high precipices at the sides masses of rock and stone fall along the edges of the glacier, but it is obvious that they do not remain there in an immovable talus; for where one glacier opens into another the piles of stones next the fork do not terminate as they join at this point, but are continued in a long mound of the same varieties of stone far down the glacier; and as other branches come in, each adds its new mound, till sometimes 4 or even 6 parallel ridges are thus produced. These may come in contact with one another below, and thus be reduced in number, and even be blended with the piles at the edges. In some form, however, the mounds continue to the foot of the glacier; and there ridges of boulder-shaped stones and gravel are seen, which lie in front of the glacier, and are sometimes repeated in nearly parallel lines like the little ridges of sand and drift material along a sea-beach, each one of which marks the limit of some previous high tide. So these great ridges of sand and stones, called *moraines* or borders, mark the limits reached by the foot of the glacier at former times; and as the tide marks are all removed when a high-course tide again sweeps far up the beach, so the ridges at certain periods are observed to move on before the advancing glacier, and mix together in a new and larger moraine at a greater distance from the mountains. It is in these periods that the habitable valleys of Switzerland are some-

times invaded by the terrible ice wall. Irresistibly and imperceptibly it is found advancing upon the farms and cottages. The warm summer weather is obviously hastening its dissolution, yet its dimensions do not sensibly diminish. The green forests slowly disappear before it; and the growing wheat almost feels its icy touch, before the soil is lifted by its ruthless ploughshare. When, after such an advance, the glacier recedes to its former bounds, the surface it covered is found to be changed into a dismal waste of loose stones.—The gathering and distribution of these materials by action of glaciers have been subjects of special interest, from the resemblance in most of the phenomena exhibited to those connected with the distribution of the geological formation known as the drift. The loose rocks are worn into the rounded forms of boulders, and are similarly striated and grooved upon their surface, and sometimes polished. The rocks upon and against which the glaciers have pressed are found, wherever exposed to view, to be ground smooth and deeply marked with lines corresponding in direction with the course of the glacier at the spot. The surface of Greenland, could it be seen, would unquestionably display these features upon a scale more commensurate with that presented by the drift formation. It is upon these resemblances, and others connected with minor details of the two classes of phenomena, that the glacial theory of Venetz and De Charpentier, so fully elaborated by Agassiz, is based, accounting for the distribution of geological formations like the drift. The transporting power of glaciers was recognized by Prof. Playfair of Edinburgh as far back as the year 1816, and the occurrence of the enormous boulders on the Jura was attributed by him to glaciers, the track of which he supposed lay at one time across the valley of Switzerland and the lake of Geneva, which now separate the Jura from the opposite summits of Mont Blanc. It is on these summits, at the distance of from 70 to 80 miles, that are found the ledges of granite and other rocks, which are recognized as identical with the great boulders scattered over the surface of the Jura limestone.—The quantity of stony material, and the enormous size of the masses of rock carried along by glaciers, is little appreciated, even by many who have seen the loads apparently quietly resting on their surface. Sometimes the ice is almost concealed by the accumulated piles of stone which cover it. These do not sink into the ice, except as they occasionally fall into the chasms, and even then they are sometimes brought again to the surface by the action of the forces which keep most of them there. As the rock protects the ice beneath it from the melting action of the sun, which has its effect around, the rock is thus gradually lifted upon a pedestal of ice, at the same time that the whole is slowly moving down to a lower level. When the pedestal at last gives way, the rock slips down and the process is repeated. When once

in the ice, the superficial melting may bring it again to the surface. The size of the fragments is often immense. Prof. Forbes saw one in the valley which must have been brought down by the glacier, the dimensions of which were nearly 100 feet in length and from 40 to 50 in height; and at the foot of the glacier of Swartzburg in the valley of Saas was another estimated to contain 244,000 cubic feet, requiring an average diameter of nearly 62 feet.—The rate of progress of glaciers, dependent upon various conditions, is no more uniform than that of rivers. It can in no case be correctly estimated except by observations extending over many years. On the glacier of Aar, M. Hugi erected a hut in 1827 at the foot of a fixed and well known rock. In 1836 the hut was 2,200 feet from the rock, and in 1840 this distance had doubled. In the first period its progress had been 250 feet per annum, and in the second 550. Prof. Forbes in 1842 found the remains of a ladder, which, it is believed, was the one left by De Saussure in 1788 at a point 16,500 feet further up the glacier. If so, its yearly progress had been at the rate of 875 feet. This movement extends through valleys in which the surface of the glacier appears to lie almost upon a dead level. It is made manifest day by day by a row of stakes set up in a straight line across the glacier, and ranging with fixed points on the land at the sides. These are after a time observed to lie upon a semi-circular line, the stakes near the centre moving faster than those near the margin. The importance of correctly estimating the rate of movement at short intervals and in different parts of a glacier, in order to determine the nature of the motion, appears to have been first appreciated by Agassiz in 1841, and by Prof. Forbes, who was engaged about the same time in his explorations. Agassiz discovered that the central portion moved faster than the marginal, and he was the first to correct the erroneous views into which he had been led with others on this point, from the fact of the great cracks generally lying in curved lines with the convexity directed up the course of the glacier. (*Système glaciaire*, by Agassiz, Guyot, and Desor, p. 462.) Prof. Forbes, by careful instrumental observations made in 1842, detected the rate of movement in periods of 24 hours, and was able even to notice that which took place in the short space of an hour and a half. He proved the faster rate of motion of the central portions, and also that the portions of the glacier near the surface moved faster than those near the bottom. The rate of motion he found was greatest on the slopes of greatest descent; in warm weather more rapid than in cold; yet always continuous, and not exhibited in the manner of jerks. Such facts are opposed to the theory of De Saussure, that the glaciers move by slipping along upon their bed, the motion being made more easy by the buoyant property of the water flowing beneath them, and the propelling force being that of gravitation. More—

over, the ice, without being broken up, was observed not to be interrupted in its movement by the contracted passages through which it was sometimes forced to pass, nor by solid hills of rock, which lay like islands in its path. The theory maintained by De Charpentier, and supported by Agassiz in his *Études sur les glaciers*, was that the glacier slid upon its bed, not necessarily in large bodies pushed on by gravitation, but that different portions were impelled by different degrees of force, arising from the expansion of the water congealing in all the fissures and capillary tubes of the ice into which it found its way. The facts developed by Prof. Forbes—that the motion was greatest in the warm summer weather, when the temperature did not descend below the freezing point, and that it did not cease when the ice was no longer liquefied in the cold of winter—demanded some new explanation. With the other phenomena they were regarded by him as sufficient to establish the fact that ice in large bodies is not a brittle solid, but that it possesses, particularly when saturated with water, so much plasticity, that with time it can yield to a stupendous and steadily exerted force, and move somewhat like a body of viscous pitch or lava, which, while it appears brittle when suddenly struck, can yet mould itself in the mass to the surface upon which it rests. By this theory, which was generally received even by those who first opposed it, all the difficulties attending the explanation of the movement disappear. It was confirmed by a simple experiment made by Mr. Christie, secretary to the royal society. He filled with water a 10-inch hollow shell of iron, the shell itself being beside 1½ inches thick, and exposed this to severe cold. As the water expanded in freezing, a cylinder of ice was pushed up through the fuse hole, and it continued to increase in length as the water continued to freeze. As the outer portions of the water must have been first converted into ice, it is plain that it was this so called solid material which was forced through the narrow aperture and made to assume the form of a cylinder of its diameter. But the peculiar nature of this quality of mobility belonging to ice has been more perfectly explained, together with some of the other phenomena of glaciers, by the recent researches of Professors Tyndall and Huxley of the royal institution, an account of which is published in the "Philosophical Magazine," vol. xv. (4th series), 1858. The property of particles of ice when exposed to higher temperatures than the freezing point to adhere, and under pressure to unite in one mass, was observed by Prof. Faraday, and was afterward made the subject of various experiments by Messrs. Tyndall and Huxley. They found that compact transparent ice might be crushed to fragments, and these be made by a hydraulic press to assume in a few seconds of time the shape of any mould, recovering in their new form perfect solidity and transparency. A straight bar of ice was also bent into a semi-

circular form by using a succession of 4 moulds of gradually increasing curvature. As the prism conformed itself to these, cracks were produced, and crackling sounds were emitted, reminding one of those which are so often noticed among the phenomena of glaciers. It is by reference to this before unobserved property of ice that the movement and unbroken continuity of glaciers and of their branches are now explained.—The glaciers from their very source present a series of changes of structure, which have been critically observed and traced, and in some instances illustrated and explained by experiments on a small scale with other materials. The snowy region, known by the French term *nevé*, is formed of dry and granular snow, which extends for miles, sometimes broken up by chasms of immense dimensions, and at others presenting no irregularities of surface such as are common to the glacier below, no streams, crevices, moraines, or cones. The snow lies in strata, which reach to great depth, each representing the accumulation of a single year, and the lowest observed the most dense and approaching the blue color of ice. These bodies move onward to form the glacier proper; and as they pass into this, their material assumes more and more the character of compact ice. But a remarkable and peculiar feature is the veined or laminated structure, real, or apparent only, which it assumes. This is noticed in the walls of the fissures, and is also displayed upon the surface of the glacier itself, when this has been wasted by rain. Thin laminae of transparent blue ice alternate with others of white porous ice, and standing together in a vertical position the edges of the former project a little above those of the latter, which more readily melt, and thus a ribbed appearance is produced. The direction of the laminae is across the fissures, and as observed by Professors Tyndall and Huxley these are produced at right angles to the direction of greatest tension. They find an analogy between the lamination of the ice and the slaty cleavage of the clays and slates, both which they refer to pressure causing the development of divisional planes in lines approximately at right angles to the direction of pressure. Hence the obliquity of the lamination to the sides of the glacier as the lines extend from the margin toward the centre and down its course; and the deviation directly across the glacier, or at right angles with this and parallel with its axis, as the form of its bed or other causes produce a pressure in the one case exerted longitudinally and in the other laterally with the line of the glacier. It was by submitting plastic materials, as wax, to pressure, and observing the laminated structure these assumed, that these gentlemen were led to this explanation of the phenomenon as developed in glacier ice; but others, as Prof. Forbes, describe the white ice as produced merely by lines of cavities or of air bubbles in the blue ice itself, the result, according to the observation of Prof. James Thompson, of partial liquefaction induced



by pressure; and Prof. William Thompson attempts to prove "that the first effect of pressure not equal in all directions on a mass of snow ought to be, according to the theory, to convert it into a stratified mass of layers of alternately clear and vesicular ice, perpendicular to the direction of maximum pressure." But the complete explanation of this structure will require experimental researches upon ice which have not yet been made.—Another interesting feature in the appearance of glaciers, to which attention was first directed by Prof. Forbes, is the distribution of what he called the dirt-bands, discolored streaks seen upon the surface, which he supposed were connected with the veined structure, appearing where this is more energetically developed than elsewhere, and caused by the collection of sand and dirt in the decomposed portions of the softer laminæ. These are arranged in curves, the convexity of which is turned down the glacier, and are frequently so obscure that they are distinguished only by looking down upon them from some elevation. Professors Tyndall and Huxley describe them as spread out upon the smooth ice below ice cascades, and were able to cause a similar symmetrical arrangement of dark-colored sand distributed upon the surface of a current of fine mud, which they made to flow from a reservoir down an inclined trough, through a narrow channel, which spread out below over a widened area.—Various other phenomena connected with the structure and motion of glaciers are discussed in the treatises upon this subject already referred to. The latest publication is by Prof. James D. Forbes, entitled "Occasional Papers on the Theory of Glaciers, now first collected and chronologically arranged, with a Prefatory Note on the Recent Progress and Present State of the Theory" (Edinburgh, 1859).

GLACIS, in fortification, the superior slope of the parapet of the outer breastwork or covered way, descending by a gentle declivity to the level ground. It must be protected at every point by the guns and musketry of the fort.

GLADIATORS (Lat. *gladius*, a sword), in Roman antiquity, men who fought with each other at the public games, for the entertainment of the spectators. They were originally captives, slaves, or condemned criminals; but under the republic free-born citizens, and under the empire knights, senators, and even women, fought in the arena. Those who were malefactors were divided into 2 classes, those condemned *ad gladium*, to be killed within a year, or *ad ludum*, who were discharged if they survived till the expiration of 3 years. Professional gladiators were trained in schools at Rome, Capua, and Ravenna, by overseers (*lanistæ*), who either purchased and maintained them to let them out for public exhibitions, or only trained them for their owners. Claudius and Milo employed gladiators as a political force in their struggle; Cæsar had 5,000 of them at Capua, who were not overlooked by Pompey.

They were taught the postures to be assumed in falling and in dying, and such food was chosen as would thicken their blood in order to give the spectators a more leisurely view of their death. The public combat began with weapons of wood, which were soon exchanged for deadly arms. According to their arms or modes of fighting, gladiators were divided into numerous classes. Usually they were matched by pairs. The *andabata* fought blindfolded, the *catorarii* in troops, the *essellarii* in chariots, the *equites* on horseback, the *hoplomachi* in full armor, the *laqueatores* with the lasso, the *mirmillones* with the weapons of the ancient Gauls, the *Samnites* with those of the people of Samnium, the *Thracæ* with a dagger and round buckler. The *retarii* were lightly equipped, and fought by throwing a net lasso-fashion over the head of their antagonist, and then despatching him with a three-pointed lance or trident. If a combatant was vanquished, but not killed, his fate depended on the people, who turned their thumbs down if they wished him to be spared. A man who had once been a gladiator was always regarded as disgraced, and, if a knight, could not resume his rank. Gladiatorial contests were first exhibited at Rome in 264 B. C., as an entertainment at funerals, and they continued till the reign of Honorius (A. D. 404), when Telemachus, a Christian monk, rushed between two contending gladiators at Rome, and by his self-sacrifice occasioned the decree for their abolition. The passion for them had risen to its height under the emperors. Titus ordained a combat of 100 days, and Trajan one of 128 days, in which 10,000 gladiators fought, and 11,000 fierce animals were killed. Rome was imperilled in 73 B. C. by a rebellion of gladiators under Spartacus.

GLADSTONE, WILLIAM EWART, a British statesman, born in Liverpool, Dec. 29, 1809. He is the 4th son of Sir John Gladstone, a wealthy merchant, who relinquished a small business in Glasgow about 1785, and removed to Liverpool, where he acquired a large fortune in the West India trade, and was created a baronet June 27, 1846. At the usual age the son was sent to Eton, where he contracted with the present duke of Newcastle, then earl of Lincoln, a warm friendship, which is commemorated by Benjamin Disraeli in his novel of "Coningsby," and which has remained unbroken to the present hour. Mr. Gladstone's career at Eton gave full promise of the special brilliancy which marked his subsequent academic course at the university of Oxford, where he was graduated at Christchurch in 1831, as double first class, the highest honor, and one rarely attained; after which he became a fellow of All Souls'. After travelling for a short period he entered parliament in Dec. 1832, as member for Newark, a nomination borough belonging to the duke of Newcastle; which position he retained until 1847, when he became a representative of the university of Oxford. In Dec. 1834, he was appointed by Sir Robert Peel a lord of the treasury, and in 1835

under secretary for colonial affairs, which office he filled but for 2 months, when the government to which he belonged was overthrown. He continued a useful and active as well as brilliant member of the opposition party led by Sir Robert Peel, until that statesman's return to power in 1841, when he was sworn a member of the privy council and appointed vice-president of the board of trade and master of the mint. In this position he explained and defended in parliament the commercial policy of the government, and the revision of the British tariff in 1842 was almost entirely his work. He did not, however, confine himself to political labors. He was a constant contributor to the "Quarterly Review," chiefly on literary and ecclesiastical subjects. He also wrote during this period his work on church and state, which created so much sensation, and the extreme high church views maintained in which afterward considerably hampered his political career. In May, 1843, he succeeded Lord Ripon as president of the board of trade, but in Feb. 1845, he resigned his offices on the introduction of the measure for the increase of the Maynooth grant, which was directly opposed in principle to the opinions he had expressed in his work on church and state. In Nov. 1845, Sir Robert Peel resigned, but, on the failure of Lord John Russell to form a government, owing to a difference between Lords Palmerston and Grey, he was recalled and reconstructed his cabinet, Mr. Gladstone becoming secretary for the colonies in the room of Lord Stanley (now earl of Derby). In the free trade measure announced by Sir Robert Peel in Jan. 1846, Mr. Gladstone fully concurred with the ministry; but being unwilling to remain under obligations to the duke of Newcastle, he felt himself constrained to resign his seat for the borough of Newark, and was consequently out of parliament during the debates on this measure. At the general election of 1847 he was chosen to represent the university of Oxford, and one of his first speeches in parliament was in favor of the Jew bill, which he had opposed in 1841. His speech against the foreign policy of Lord Palmerston in the Don Pacifico debates was generally regarded as one of the most admirable pieces of English eloquence the last half century has heard. In the ministerial crisis of 1852 he was invited by Lord Derby to enter his cabinet, but declined, and on the overthrow of that minister in Dec. of the same year accepted the office of chancellor of the exchequer under the earl of Aberdeen. While holding this office he introduced in 1853 his celebrated budget in those remarkable series of addresses which were eulogized by Mr. Cobden, and pronounced by Lord John Russell "to contain the ablest expositions of the true principles of finance ever delivered by an English statesman." On the resignation of Lord Aberdeen in Feb. 1855, and the elevation of Lord Palmerston to the premiership, Mr. Gladstone continued to hold his office of chancellor of the exchequer;

but he soon resigned, together with Sir James Graham, Mr. Sidney Herbert, and the other Peelite members of the government, in consequence of Lord Palmerston's refusing to oppose a motion of inquiry into the conduct of the Crimean war, which was considered indirectly to convey a censure on the duke of Newcastle and Mr. Sidney Herbert. On the overthrow of Lord Palmerston's government and second accession of Lord Derby to power, Mr. Gladstone again declined the pressing overtures of that nobleman, but, in Nov. 1858, accepted an appointment as lord high commissioner extraordinary to the Ionian islands. In 1859, on Lord Palmerston's return to office, Mr. Gladstone again became a member of the government as chancellor of the exchequer.—Mr. Gladstone married, July 25, 1839, Catharine, the eldest daughter of Sir Stephen Richard Glynn, M. P. for Flintshire, and has a numerous family. In person he is slight and nervous, with a countenance in which a singular sweetness of expression is blended with an eager student look. As a debater he is acknowledged universally to hold the first place in the house of commons, and his reputation as an administrator is almost equally great.—The published works of Mr. Gladstone include "The State in Connection with the Church" (2 vols., 1838), "Church Principles Considered" (1 vol., 1840), "Studies on Homer and the Homeric Age" (8 vols., Oxford, 1858); and he has supervised a translation of Farini's *Stato Romano* (4 vols., London, 1859). In 1851 he published a "Letter to Lord Aberdeen" on the cruelties inflicted on the political prisoners confined in the dungeons of Naples, which produced a universal and very deep impression.

GLADWIN, an E. co. of Mich., intersected by Titibiwassee river; area, 570 sq. m. Its surface is moderately uneven, and its soil consists of a sandy loam. It is not included in the census of 1850, having been recently erected.

GLAGOLITIC, one of the two ancient Slovenic, or less correctly Slavonic, forms of writing. It is derived from the 4th letter, *glagol*, equivalent to our hard *g*, as in *go*, *give*; and is also known as the *Bukvitsa*, from *bukva*, letter, or from the names of the 2d and 3d letters, *buk* and *vida*, or *b* and *v*. Its formation is attributed by some to St. Jerome, and by others to Methodius, the apostle of Pannonia and Great Moravia (about 860). The shape of the 32 letters (of which 27 are also numeral signs) is very grotesque and protean, little resembling the Greek. The Glagolitsa was used in Illyria, Dalmatia, and Bulgaria. The other form of Slovenic writing is the *Kirilitsa*, contrived by Cyrillus, the reputed brother of Methodius, many letters of which are like the Coptic, because they imitate the Greek forms. This consisted originally of 40 letters, and is still in use among the eastern Slavi and the Wallachians. The Russian *azbuka* or *bukvar* (alphabet) is a slight modification of the latter, with 32 letters. These systems have been much extolled by some authors; but, though representing all sounds of the lan-

guages, they are imperfect, inasmuch as they contain single signs for complex sounds, such as *ts, tsh, shih, ye, ya, yu*. The nations that employ these graphic systems belong mostly to the Greek church; while the Catholic Slavi (Poles, Bohemians, Slovacks, Lusaticans, &c.) make use of the Latin or the so called German letters, with some modifications. The most remarkable works in Glagolitic writing are: *Glagolita Olosianus*, by Count Paris Cloz of Trent in the 11th century, edited by Kopitar (Vienna, 1886); *Codex Assemanicus, continens Lectiones Evangelicas, Bibliotheca Vaticana, in Aug. Maiji Scriptorum Veterum Nova Collectione*; *Codex continens Psalmos, cum Expositione S. Athanasii*, &c., at Bologna; all these are in the Bulgarian idiom. *Breviarium* (edited by Brozich, Venice, 1561) is in Serbian.

GLAIRE, JEAN BAPTISTE, a French theologian and orientalist, born in Bordeaux, April 1, 1798. A brilliant pupil of the seminary in his native town, he was sent to Paris, where he entered the St. Sulpice seminary to complete his theological studies, meanwhile studying the Hebrew, Chaldaic, and Syriac languages under the direction of the abbé Garnier; he also attended the lectures of Sylvestre de Sacy on the Persian and the Arabic, and those of Eugène Burnouf on the Sanscrit. Taking holy orders in 1822, he taught Hebrew in his seminary, and was in 1825 appointed to fill the chair of Chanaui de Lanza at the Sorbonne. In 1838 he obtained the degree of D.D., and was in 1841 made dean of the faculty of theology. In 1848 he left the chair he formerly occupied to take another, where his special duty was to expound the Holy Scriptures. Two years later he was nominated counsellor of the university and member of the legion of honor. An honorary canon of Bordeaux since 1827, he was in 1851 promoted to the honorary vicarship of that archbishopric. His most important works are: *Lexicon Manuale Hebraicum et Chaldaicum* (8vo., Paris, 1830; new ed., considerably enlarged and improved, 1848); *Principes de grammaire Hébraïque et Chaldaïque* (8vo., Paris, 1832; new ed., 1836 and 1848, with a *Chrestomathie Chaldaïque et Hébraïque*); *La sainte Bible en Latin et en Français*, with notes, explanations, &c. (8 vols. 4to., Paris, 1834); *Torath Mosché, Le Pentateuque*, with a French translation and notes, of which the two first parts only have been published, Genesis and Exodus (2 vols. 8vo., Paris, 1835-'7); *Introduction historique et critique aux livres de l'Ancien et du Nouveau Testament* (6 vols. 12mo., Paris, 1836), an abridgment of which appeared in 1846 (1 vol. 8vo.); *Manuel de l'Hébraïsant*, containing a grammar, a chrestomathy or choice pieces, and a lexicon (12mo., Leipsic, 1856); *Concordances Arabes du Coran*; *Principes de grammaire Arabe* (1857).

GLAMORGANSHIRE, a maritime co. of S. Wales, bounded N. by Caermarthenshire and Brecknockshire, E. by Monmouthshire and the Severn, S. and W. by the Bristol channel; area

660 sq. m.; pop. in 1851, 281,849. The northern portion is mountainous, but the southern is level and fertile. The principal crops are wheat, barley, oats, beans, peas, vetches, and turnips. The horned cattle are of superior quality, and in the mountain districts great numbers of sheep and ponies are reared. Glamorganshire is famous for its coal and iron mines. In the neighborhood of Merthyr-Tydvil the iron works are on a gigantic scale; within a small circuit there are upward of 60 blast furnaces, some of which have more than 4,000 workmen engaged on them. Vast quantities of coal and iron are annually exported from Cardiff. The principal rivers are the Rhymney, the Taff, and the Tawe. The chief towns are Cardiff, the capital, Merthyr-Tydvil, Swansea, and Neath. This county has also some woollen manufactories, and numerous canals and railways. It returns 5 members to parliament—2 for the county, and one each for the boroughs of Cardiff, Merthyr-Tydvil, and Swansea.

GLAND (Lat. *glans*, an acorn), in anatomy, the general name of a variety of organs whose functions are to elaborate the various products of secretion from the blood, to perform certain offices connected with absorption and assimilation, and to assist in the process of preparing and maintaining the circulating fluid in a normal condition. Of the first class of glands the liver and the kidneys are examples, of the second the mesenteric and lymphatic glands, and of the third the spleen. The true secreting glands are of various form, size, and structure, but are all constructed with special reference to the arrangement of the nucleated and epithelial cells and tubes or cavities which enter into their texture; their products are poured forth either on the outer surface of the body, or on some cavity or canal communicating externally, and the cells which effect the separation of their special secretions from the blood are generally in the relation of epithelium cells to the inversions of the skin or mucous membranes that form the greater part of their follicles or tubuli. These cells generally minister to the act of secretion by yielding up their contents by rupture, as in the mammary gland and liver; some of the more liquid excretions, as the sweat and urine, are formed without the destruction of the cells lining the gland tubes, though in most this act is the result of vital processes, a constant development, growth, and destruction of gland cells. The different secretions cannot be explained by any differences of supporting structure, by the amount of blood, or the arrangement of the vessels in the respective glands. Some glands, like the kidneys, discharge their secretions as soon as formed, for the purification of the blood; others, like the testes, store up their products for occasional use; while others, like the salivary and lachrymal glands, constantly secrete a small quantity, which is easily increased by special excitement. The great majority of glands with permanent ducts may be divided into 3 groups, according to the modes

in which the cell-containing tubes are arranged: 1, the simple tubular glands, like the follicles of the stomach and intestines, which seem to be mere depressions in the mucous membrane, elongated gland vesicles lined with secreting cells; 2, the aggregated or conglomerate glands, in which a number of vesicles are grouped into lobules, and these again into lobes joined by loose areolar tissue, like the salivary, mammary, pancreatic, prostate, and lachrymal glands, and also the liver; 3, the convoluted tubular glands, as the kidneys and the testes, ending in dilations, cul-de-sacs, or loops. In all a large extent of secreting surface is packed in a small compass; while one end of the gland and duct opens on a free surface, the opposite end is closed, with no direct communication with blood vessels or other canals. The glands of secretion have been divided into 2 classes, according as their product is excrementitious and to be cast off, or to be used within the system; the former are called more properly excretory glands, and include the liver, kidneys, testes, and prostate, and those which supply the cutaneous and pulmonary transpiration and the peculiar fecal fluids of the lower part of the intestinal canal; the true secretory glands are the gastric, salivary, mammary, sebaceous, mucous, lachrymal, Brunner's, and the pancreas. The kidneys, liver, mammary glands (secreting respectively urine, bile, and milk), and the pancreas will be described under their proper titles; the salivary and gastric glands have been noticed under *Digestion*; the sebaceous, ceruminous, odoriferous, and sudoriparous glands (secreting the oily, waxy, odorous, and perspiratory matters of the surface), will be treated in the article *Skin*; the follicles of Lieberkühn (in the small and large intestine), Brunner's glands in the duodenum, and the solitary glands most numerous in the cæcal region, will be described under *Intestine*; the lachrymal glands are spoken of under *Eye*; the so called glands of Pacchioni and the pineal body or gland are alluded to in the article *Brain*. The air passages of the chest and head, the alimentary canal above the stomach, and the genito-urinary apparatus, are provided with solitary and aggregated glands and follicles for the secretion of their lubricating mucus; the tonsils are glandular masses principally, and there are numerous follicles in the posterior fauces, and in the neighborhood of the epiglottis and entrance to the larynx, whose diseased secretions and ulceration constitute the kind of *folliculitis* popularly called "clergyman's sore throat."—Another system is that of the vascular or ductless glands, which possess all the elements of glandular structure, except the efferent ducts; restoring therefore to the blood whatever they take from it, it is generally admitted that they perform some part in the process of sanguification, probably acting upon such nutrient materials as are taken up directly by the blood vessels without in the first instance passing through the absorbents. These glands are the

spleen on the left side of the abdominal cavity; the thymus gland, a fetal organ in the anterior mediastinum; the thyroid body, on the anterior portion of the neck; and the supra-renal capsules, surmounting the kidneys; these will be described in their alphabetical order. They are composed of vesicles or sacculi, simple and closed, or branched, of a delicate membrane surrounded with a vascular plexus, and filled with an albuminous fluid containing fat granules and nucleated cells. The opinion that these glands serve for the higher organization of the blood materials is supported by the fact that they are especially large and active during fetal life and childhood, when the most abundant supply of nutrient fluids is necessary; they are also believed to be concerned in supplying the germs of cells which are ultimately to become blood corpuscles. They are not essential to life in the adult; the thymus entirely disappears, the thyroid may be completely disorganized, and the spleen be removed (as has been often done in animals), without any apparent ill consequences; the supra-renal capsules seem to preside over the production of the pigment cells, and their morbid condition or atrophy is connected with the peculiar disease known as "bronzed skin."—The last group includes the absorbent glands, the patches of Peyer, the mesenteric, and the lymphatic glands. The lacteals and the fluid they convey have been described under *Absorption* and *Chyle*. Peyer's glands, most numerous toward the ileo-cæcal valve, are intimately connected with the lacteals; whether single or in clusters, they are always in that portion of the intestine which joins the mesentery; they are capsules, containing fatty and albuminous matters, with nuclear particles and cells, all apparently undergoing rapid changes; the exterior and interior of the capsules are freely supplied with blood. In the mesentery are situated the mesenteric glands, which bear the same relation to the lacteals that the absorbent glands do to the lymphatics; each gland is enclosed by a fibrous sheath, which forms by its partitions an internal supporting framework; the intervening alveoli are filled with a grayish pulp, as in Peyer's patches, penetrated by a fine capillary plexus, and in free communication with the afferent and efferent ducts between which they are situated; the number of corpuscles of the chyle is greatly increased by passing through these glands, which perform a most important part in the blood-making or assimilating process. No lacteal or lymphatic reaches the terminal thoracic duct without passing through one or more of these glands. In the lower vertebrates plexuses of lymphatics occupy the places of the glands of birds and mammals. Glands are situated all along the course of the lymphatic vessels, both superficial and deep-seated. Familiar examples are the glands in the groin, the seat of syphilitic and scrofulous abscesses, and often swollen from irritation of any portion of the lower extremity; the axillary glands in the armpit, often requiring surgical interference for enlargements and ab-

scesses; and the glands on the sides of the neck, the seat of frequent suppuration in scrofulous children and adults.

GLANDERS, a contagious and fatal disease, arising in man from the introduction into the system of a specific animal poison from the horse, characterized by glandular swellings and abscesses in various parts of the body, by pustular and gangrenous eruptions and ulcers on the skin and mucous membranes of the air passages, and by a profuse and fetid purulent discharge from the nose. In the horse there are two forms, which have received different names, though they are stages of the same disease; when seated in the lymphatic glands and vessels, it is called farcy, and when in the nasal cavities, glanders; the purulent matters of either of these forms will produce the other, and the former will proceed to the latter if the animal live long enough, though glanders generally arises first. The hard cord-like swellings of the lymphatics and their glands are called farcy buds; these suppurate, and form fistulous ulcers, discharging a thin sanious matter. In glanders in the horse, there is a constant flow from the nostrils, at first thin and watery, afterward thick and opaque, and finally purulent, bloody, and fetid; the vesicles which form on the Schneiderian membrane become foul ulcers, involving even the bones of the nose; the soft parts of the face swell, ulcerate, and become gangrenous, causing speedy death from putrid fever or the slower process of exhausting suppuration. Glanders in man has been called *equinia* by Elliottson, indicating its origin from the horse family, and corresponding in termination to *vaccinia*, or small pox modified by passing through the system of the cow. This disease has been long known in veterinary medicine, but it is less than 40 years since it was ascertained that it could be communicated from horses to man as a specific affection equally fatal to equine and to human life; since then the cases have so multiplied that there cannot be a doubt that the accidental inoculation of glanderous matters from the horse will produce the same disease in man; it has been positively asserted that the glanders may be communicated by infection without actual contact with the morbid products, but this may reasonably be doubted. Acute glanders has a period of incubation varying from 3 to 8 days, when the symptoms attending the action of animal poisons begin to show themselves, such as severe wandering pains, high fever, delirium, profuse and offensive perspiration and discharges; the inoculated part becomes red, swollen, and painful, and the lymphatic vessels and glands inflamed, followed by diffused abscesses in the neighborhood of the large joints, and by symptoms of typhoid fever and great prostration. In a few days a shining livid inflammation invades the face, and the characteristic viscid, offensive, and sanious discharge is poured out from the nostrils; at the same time numerous hard and large pustules appear

on the face; these pustules spread over the neck and body, the nasal discharge is accompanied by gangrene, the abscesses increase in size and number, and death occurs in the low muttering delirium of the putrid fevers. In chronic glanders there is the peculiar nasal discharge, with pain and swelling of the nose and eyes, emaciation, profuse perspiration, abscesses, and gradual exhaustion of the vital powers. In acute farcy the first symptoms are those of inflammation of the lymphatics leading from the wound or abrasion, followed by abscesses, pustular eruptions, and nasal discharge of glanders. In chronic farcy the progress is slower, the abscesses degenerating into foul ulcers, and the disease terminating, perhaps after the lapse of months, in acute glanders, if the patient survive the exhausting suppuration. The pustules commence in the skin or on the mucous membranes, but the unhealthy inflammation soon involves the underlying areolar tissue, forming greater or smaller purulent collections; the foul ulcers of the nasal passages and their connected sinuses commence by a pustular eruption on the mucous surfaces; the ulcers often extend to the pharynx and larynx, and small abscesses are found in the lungs, the consequence of purulent absorption; the veins and lymphatics are usually more or less filled with pus, and always inflamed in the vicinity of the inoculated part. The average duration of this disease is from 15 to 20 days; it sometimes proves fatal in one week, and may be prolonged to the 6th. The glanders was formerly confounded with the malignant pustule, from which it is distinguished by the general symptoms preceding the eruption, by the numerous abscesses, and the peculiar nasal discharge; in ordinary purulent absorption there is not the pustular and gangrenous cutaneous eruption, neither will the inoculated pus reproduce the specific lesions of glanders. The general assemblage of symptoms will also sufficiently distinguish it from malignant small pox, scurvy, and gangrenous typhoid fevers. Glanders in the horse may arise spontaneously when the animal is exposed to insufficient or unwholesome food, foul air, and confinement; but there is no record of these or any other similar causes having produced the disease in man; he always contracts it from the horse or ass by actual contact with the glanderous matter; the miasmata of the disease will often convey a malignant and fatal form of fever to man, but never, as far as is known, the true glanders. The blood of a glandered horse injected into the veins of a healthy one will produce the disease; it appears in from 8 days to a month after inoculation, according to circumstances ill understood. It does not appear that ruminating or carnivorous animals are subject to glanders; it is probable that other solipeds, as the jaghtai, quagga, and zebra, are susceptible to the disease, which seems peculiar to the *equidae*. The prognosis in the acute disease is highly unfavorable, a little less so in the chronic form, though recovery in either case is a rare

exception; of course those having charge of glanderous horses should take the greatest precautions against inoculation of any wound or abrasion, though some constitutions seem proof against even this highly contagious disease. It is produced by the introduction into the blood of man of a specific animal poison, existing in its most intense form in the nasal secretions and purulent discharges of glanderous horses; the disease in the horse and in man is unquestionably the same; the nasal discharge in the latter is less remarkable, and indeed may be absent, because in him, prostrated on his back, the secretions of the nose fall down into the throat, and are spit from the mouth, while in the horse the fetid matters would naturally flow from the nose. If any thing were wanting to complete the chain of evidence, we have it in the fact that the inoculation of the nasal and purulent matters from men affected with glanders has always produced the same disease in the horse and ass. No treatment has been found effectual in this disease; the blood being poisoned from the beginning, the indication is to support the strength by stimulant and antiseptic tonics, especially wine, ammonia, and ether; all depletion is out of the question; swollen glands may be extirpated, abscesses opened as soon as formed, and the nasal cavities injected with creosote and chlorinated solutions; nervous irritation may be quieted by narcotics, and the foul odor annihilated by chlorine and other disinfectants. Creosote, according to Elliotson, is the best remedy; iodide of potash and iodine have been successfully employed in acute farcy.—For fuller details on glanders and farcy, the reader may consult Elliotson in vols. xiii., xviii., and xix. of the "London Medico-Chirurgical Transactions;" Rayer, in the *Mémoires de l'Académie royale de médecine* (1837); Dr. Burgess, in his translation of Cazenave on "Diseases of the Skin" (London, 1842); and occasional cases in the domestic and foreign medical journals.

GLANVIL, or GLANVILLE, RANULF DE, chief justiciary of England in the reign of Henry II., and supposed author of one of the oldest treatises on the laws of England, died in 1190. He was of Norman descent, signalized his valor under Henry II. in repelling the invasion of England by William of Scotland, accompanied Richard I. on the crusade, and perished at the siege of Acre. The work ascribed to him is entitled *Tractatus de Legibus Consuetudinibus Regni Angliæ, Tempore Regis Henrici Secundi*, was first published in London in 1564, ranks with those of Britton, Bracton, and Fleta, and is relied upon as authority by the principal modern authors. Some of the manuscripts state only that it was written in his time, without ascribing it to him. The best edition is that by John Wilmot (1780). The only English translation is by John Beames (1812).

GLANVILLE, JOSEPH, an English divine and philosopher, born in Plymouth in 1686, died in Bath, Nov. 4, 1680. He was educated at Oxford, became a priest, and was made rector of

the abbey church, Bath, in 1666. He became chaplain in ordinary to the king, and in 1678 was appointed a prebendary of Worcester cathedral. He is distinguished as an opponent of Aristotelianism, as a believer in witchcraft, and as the first writer in England who presented philosophical scepticism in a systematic form. His first work, entitled the "Vanity of Dogmatizing," was published in London in 1661, and a 2d and enlarged edition of it appeared in 1665, under the title of "Scep sis Scientifica, or Confessed Ignorance the way to Science," with a dedication to the newly founded royal society, which body at once elected him a fellow. The design of the book is to show the necessary ignorance of man and the impotence of reason in respect to the most important objects of knowledge, and especially to censure the verbal and captious character of the prevalent peripatetic philosophy, with its meaningless terms and definitions. In his treatment of the question of causation he prepared the way for Hume. His style is animated and elegant. He made another attack on the ancient philosophy in his "Plus Ultra, or the Progress and Advancement of Knowledge since the Days of Aristotle" (1668), in which he exalted Bacon and Boyle and the inductive method. Notwithstanding his scepticism, he credited the stories of sorcery and witchcraft. The account of a drum that was heard every night in a house in Wiltshire, which furnished Addison the idea of his comedy of the "Drummer," appears to have been the occasion of Glanvill's "Philosophical Considerations concerning the Existence of Sorcerers and Sorcery" (1666), the convictions expressed in which are repeated in his *Sadducismus Triumphans*, published posthumously (1681), with an account of his life and writings by Dr. Henry More. Among his other works are *Lux Orientalis* (1662), in which he treats of the preexistence of souls, following the views of Henry More; "Essays on Several Important Subjects in Philosophy and Religion" (1676); an "Essay on Preaching" (1678); and a volume of sermons, edited by Dr. Horneck (1681).

GLARUS, or GLARIS, one of the smallest of the Swiss cantons, bounded N. and E. by St. Gall, S. by the Grisons, and W. by Uri and Schwytz; area, 280 sq. m.; pop. in 1850, 80,218, of whom 26,281 were Protestants and 8,932 Catholics. The principal of the mountain chains which occupy almost its entire surface extends from the Hausstock to the Scheibe, and has an average height of 8,000 feet, but there are many separate peaks of much greater elevation. The Doedi or Tödi, 11,887 feet high, in the S. part, is the loftiest mountain in E. Switzerland. Traversing the canton from N. to S., and extending from the land between the lakes of Zürich and Wallenstadt to Mts. Doedi and Scheerhorn, is a large valley through which flows the river Linth, and opening into this are 3 or 4 minor valleys, each the basin of a river of its own name which empties into the Linth. The chief of these are the Sernft and

the Klön. Only their deepest and most sheltered parts are habitable throughout the year, and even in such places snow often remains until the middle of April. There are several lakes, shut in by the wild and romantic scenery characteristic of this Alpine region, but none remarkable for size. The lake of Wallenstadt forms about 8 miles of its northern boundary. Not more than  $\frac{1}{4}$  of the surface is susceptible of tillage. The most fertile land lies in the valley of the Linth, where grain and fruit, particularly cherries, are cultivated with success. The accessible parts of the mountains are occupied by pastures. From these snow-capped hills, the cradles of vast glaciers, innumerable torrents pour into the valleys during the spring and summer, and often cause fearful devastation. With the exception of marble, slate, and gypsum, there are no minerals of much importance. Small quantities of coal are found, and there are ancient mines, now almost exhausted, of silver, copper, and iron. The principal kinds of timber are pine, beech, ash, maple, and chestnut. The flora, ranging from an altitude of 1,500 feet above sea level to the highest point of vegetation, is varied and rich. The chief species of game are the chamois, fox, hare, marmot, and badger. The pastures feed about 10,000 horned cattle, 12,000 sheep, and 6,000 goats. One of the most important manufactures is that of the well-known *schabzieger*, or "green cheese," made of the milk of cows and goats, mixed with churned milk, and colored and flavored with the blue pansy, locally called *klee*. The other manufactures comprise cotton, woollen, linen, and silk goods, prints, muslins, writing slates, and many articles in wood. An active trade is carried on with Germany and Italy, transportation being effected through a number of mountain passes, and by means of 2 canals which connect the Linth with the lakes of Wallenstadt and Zürich. Glarus, which occupies the 7th place in the Swiss confederation, enjoys a singularly democratic form of government, the supreme power residing in a general assembly of all the males over 16 years of age, who meet annually to elect magistrates and accept or reject the laws proposed by the executive council of 80 members. Taxation is very light, crimes are few, and education is almost universal. The canton contributes 8,615 francs to the federal treasury, and 482 men to the army. The chief towns are Glarus, Mollis, Enneda, and Schwanden.—The name Glarus is supposed to be a corruption of St. Hilarius, in whose honor a church was built in this canton about 490 by an Irish monk called Fridolin, the founder of the convent of Seckingen on the Rhine. The upper part of the valley became the property of this convent, while the lower was dependent upon the nunnery of Schännis. It was afterward subject to bailiffs nominated by the house of Hapsburg, to escape from whose tyranny the inhabitants joined the Helvetic confederation in 1852, and in 1888 secured their independence by the famous victory of Näfels.

Zwingli was curate of Glarus from 1506 to 1516. The introduction of Protestantism gave rise to many disturbances.—GLARUS, capital of this canton, is a thriving manufacturing town, situated in a secluded Alpine valley at the foot of Mts. Glarnisch and Schilt, on the left bank of the Linth, here crossed by 2 bridges; pop. 4,500. It contains a Gothic church, used by both Catholics and Protestants, a free school for 700 children, a new government house, an old town house, and a printing office. The streets are crooked and narrow, and the houses are fantastically painted. Cottons, woollens, muslins, and hardware are the principal manufactures. In mid-winter the town is almost continually in the shadow of the mountains, the sun being visible only during 4 hours of the day.

GLASGOW, the chief commercial and manufacturing city of Scotland, situated on both banks of the river Clyde, 20 m. from the sea, in the county of Lanark, lat. 55° 51' 32" N., long. 4° 17' 54" W.; distant from Edinburgh, W. by S., 48 m. by road and 48 by rail, and from London, N. E., 404 m.; pop. in 1851, including the suburbs, 844,986, of whom 162,933 were males, and 182,053 females. Following the ratio of increase of the preceding 10 years, the population would now (1859) be 401,516. Glasgow is  $\frac{1}{4}$  m. in length, and 2 m. in width. The city proper stands wholly on the N. bank of the Clyde, with the burgh of Gorbals and districts of Hutcheson and Kingston S. of the river, Anderston W., the burgh of Blytheswood and Port Dundas W. and N., and the burgh of Calton E., so blended together as to form but one city, under a common municipality and police. Glasgow is a royal, municipal, and parliamentary borough, governed by a lord provost (mayor), 8 bailies (aldermen), and 39 councillors, beside the dean of guild and the deacon convener of the trades, who are members of council *ex officio*. Two of the council exercise a species of admiralty jurisdiction over the river and frith of Clyde. About 5,000 prisoners pass through the gaols annually. The police force consists of 627 men, and the total cost of the police in 1854, including lighting and cleansing, was £64,726. The burgh returns 2 members to the house of commons. The average annual mortality is 1 in 38, and of children under 5 years of age 1 in 8. The climate is temperate, but humid; the mean annual fall of rain is 32 inches, and the mean range of temperature 49° to 75°. Glasgow has been lighted with gas since 1817. It has a large supply of water, of indifferent quality, furnished from the Clyde by a water company, and within a few years an arrangement has been made for investing the corporation with power to convey water from Loch Katrine. The ground plan of the city is tolerably regular. A principal street runs E. and W. parallel to the river, on the N. side, for a distance of  $\frac{1}{4}$  m., under the several names of Argyle street, Trongate, and Gallowgate. Parallel to this are many fine streets, as Ingram, St. Vincent, George, &c., these being intersected

by other streets running N. and S., of which the principal and most ancient is the High street and Saltmarket. The Green is a well kept park of 140 acres, lying along the N. side of the Clyde, at the E. end of the city. This is emphatically the people's park, where the various peculiarities of Glasgow life and conversation may be studied to advantage. Kelvin grove, written of by Burns, has been purchased by the city, and is being laid out as the West End park from designs by Sir Joseph Paxton. A botanical garden of 40 acres lies about 1 m. N. W. from the city, and is mostly used in connection with the botanical classes of the university, but is open to the public, at stated periods, on payment of one penny. There are many fine buildings. The cathedral or High church is the best specimen remaining in Scotland of the old ecclesiastical architecture. It stands conspicuously on high ground in the N. E. section of the city. It was commenced in 1133, but was not completed for 3 centuries. It is in the early English style, 320 feet in internal length, and 68 in breadth; the height of the choir is 90 feet, and of the nave 85 feet. A square tower rises from the centre of the building, surmounted by an octagonal spire 225 feet in height from the floor of the choir, which itself is 104 feet above the level of the Clyde. Many of its windows are of exquisite workmanship. Under the cathedral is an extensive crypt formerly used as a chapel. The whole number of churches in 1851 was 143, distributed as follows among the various denominations: Baptist, 7; Episcopalian, 5; Established church, 25; Free church, 30; Independent, 11; Roman Catholic, 7; United Presbyterian, 23; other denominations, 85. S. W. of the cathedral stood the bishop's castle, erected in 1430, but the ruins were removed in 1789 to make way for the infirmary, a fine edifice, wholly supported by voluntary contributions. The royal exchange, the handsomest building in the city, is in the florid Corinthian style, with a colonnade. Its news room is 122 feet long by 60 broad, with an ornamented roof supported by 18 pillars. Among the other edifices of a public nature are the new city and county buildings, containing all the municipal offices, as also the merchants' hall; the court house, at the W. end of the Green, with a frontage of 215 feet, in the Doric style, &c. Five bridges, all of modern construction, cross the Clyde. The Victoria bridge, 467 feet long and 60 feet wide, with 5 arches of freestone cased with granite, is one of the finest structures in Europe. Glasgow bridge, designed by Telford, with 7 arches, is 560 feet long and 60 feet wide. Glasgow contains several public monuments, among the chief of which are an equestrian statue of William III., in the Trongate; an obelisk to Nelson, in the green; a bronze statue by Flaxman of Sir John Moore, a statue by Chantrey of James Watt, and one of Sir Walter Scott on a Doric column 100 feet high, all in George square; a statue of Pitt by Chantrey, in the town hall, which also contains some historical portraits; a statue

of Sir Robert Peel; an equestrian statue of the duke of Wellington, in front of the royal exchange, by Marochetti; a statue of Queen Victoria, to commemorate her visit to the city in 1849, also by Marochetti; and one of John Knox on an obelisk in the necropolis. The commercial institutions of Glasgow are a chamber of commerce, instituted in 1788; the royal exchange and Lloyd's room, with 2,000 subscribers; E. and W. India associations, &c.; with 11 joint-stock banks and branches, and 1 savings bank. The educational institutions of Glasgow are of the highest rank. The university, founded under a bull of Pope Nicholas V. in 1451, is annually attended by 1,000 students. They are all non-resident, and pay only the fees for tuition, boarding where they please. Sixty foundations, or bursaries, in value generally from £5 to £25, a few being worth £40, and one £50, per annum, are distributed among the students, and are held for 4 or 6 years and applied in payment of tuition. In addition to these are 10 of £120 per annum, and 4 of £20 for 10 years to scholars of the Glasgow university studying at Balliol college, Oxford. There is but one session annually, from the last Wednesday of October to May 1, and the academic course extends over 4 years. Whatever other studies they pursue, students are required to attend Greek the 1st year, having previously a knowledge of Latin, logic the 2d, moral philosophy the 3d, and natural philosophy the 4th. The academic body of the university consists at present of the lord chancellor, the lord rector, the dean of faculty, the principal and vice-chancellor, 22 professors, and 1 lecturer. The office of chancellor, formerly a royal appointment, is now an honorary election for life. The university buildings are in the Elizabethan style, and have a front of 305 feet on High street, with a depth of 282 feet, forming 4 quadrangular courts, 3 stories high, with turrets, and having a spire 153 feet high; its lightning rod was erected in 1772 under the auspices of Dr. Franklin. The university contains a library of 60,000 vols. Immediately behind the college is the Hunterian museum, containing the library, coins, and anatomical collection bequeathed by Dr. William Hunter to the university. The collection is valued at £180,000. The Andersonian university is an institution on the plan of a college for the working classes. It was founded by Dr. Anderson, professor of natural philosophy in the Glasgow university, and brings within reach of operatives the study, under able teachers, of the physical sciences, medicine, literature, and the arts. It had 1,685 pupils in 1854-'5. A mechanics' institute and government school of design are also in successful operation. The high school, or grammar school, is believed to be older than the university, to which it is preparatory. Glasgow has 2 normal training schools, belonging respectively to the Established church and Free church of Scotland. The philosophical, literary, and various antiquarian societies have each their collections of



special libraries. There are several publishing houses in the city, but that business is mostly absorbed by Edinburgh. The daily and weekly newspaper press is conducted with ability. The charitable institutions are very numerous, comprising asylums for the aged and destitute, for the deaf, dumb, blind, and insane, hospitals, charity schools, and various benevolent associations. Hutcheson's hospital distributes alms to about 500 persons annually, most of whom are women, and educates and clothes between 150 and 200 boys.—Glasgow is most favorably situated both for manufacture and commerce, and beside its ocean navigation is the centre of a system of canals and railways. The Forth and Clyde canal, 35 m. long, having its Glasgow terminus at Port Dundas, unites the 2 seas E. and W. of Scotland, with 10 feet of water; the Monkland canal, 12 m. long and 6 feet deep, connects with the coal and iron mines; and the Paisley and Johnstone canal unites the city with the 2 towns from which it has its name. The railways are the Glasgow and Paisley; Monkland; Glasgow, Paisley, and Greenock; Edinburgh and Glasgow; Glasgow and south-western; and the Caledonian. There are steamship lines to New York, Liverpool, Belfast, *via* the Clyde, Dublin, Bristol, Waterford, Cork, Londonderry, Stranraer, and Portrush, together with the lines of 18 companies to all parts of the Scottish highlands and islands. The Clyde has a course of 115 miles, but is of no value as a water-course above Glasgow. The improvement of the river navigation has been intimately connected with the growth of the city. Its channel has been almost made by artificial means since 1555. In 1662 the magistrates purchased a port 16 m. down the river, and built a harbor called Port Glasgow. In 1688 a small wharf was built at the Broomielaw, but for the next 100 years no vessel drawing more than 6 feet of water could come up. The depth of water in 1855 was 19 feet. The wharves extend over 2 m. in length, with sheds and all other needful accommodation, in immediate connection with the various railways. The harbor has 48 acres of water surface. The river for 7 m. below the city has been widened and embanked with stone. Till the American war the Glasgow merchants enjoyed almost the monopoly of importing tobacco. After that event they turned their attention to the West Indian trade. Their traffic with the East Indies dates from 1816. Their timber trade with the British N. A. provinces is very extensive, and an important business is now done in Australian emigration and supply. The establishment of steamships to New York has also enabled exporters to fill orders direct, which formerly flowed through other ports. The principal articles of export to the United States are iron, coal, cotton thread, bleaching powders, sewed muslins, Turkey-red cambrics, red and yellow prussiates, jaconets, shawls, tobacco pipes, cast-iron water and gas pipes. The following table exhibits the commerce of the port in 1856:

Vessels.	Entered.		Cleared.	
	Number.	Tonnage.	Number.	Tonnage.
Steam.....	1,656	406,275	1,696	416,273
Sailing.....	1,581	226,428	2,344	274,981
Total.....	3,237	632,703	4,040	791,153

Of these totals the coasting trade employed 1,656 steam vessels (tonnage 385,544) and 112 sailing vessels (tonnage 99,981) inward bound, and 1,612 steam vessels (tonnage 384,622) and 2,378 sailing vessels (tonnage 151,478) outward bound. The entries and clearances from and to the countries chiefly interested in the foreign trade of Glasgow were as follows:

Countries.	Entered.		Cleared.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
United States.....	92	59,102	101	65,613
Italian States.....	64	11,981	43	9,410
France.....	54	7,635	800	28,951
Portugal and the Azores.	40	5,184	67	8,900
Egypt.....	25	9,296	...	...
Spain.....	29	2,666	28	4,474
Russia.....	20	3,710	8	1,410
Central and S. America.	18	6,846	46	13,991
Germany.....	18	1,848	16	1,627

In the same year Glasgow owned 413 sailing vessels of 150,621 tons, and 145 steamships of 53,039 tons; total 558 ships, with an aggregate tonnage of 203,660. The value of exports from Glasgow in 1854 was £4,905,557, and the amount of customs dues collected on imports £666,818.—The manufactures of Glasgow are cotton goods, woollens, silks, shawls, carpets, glass and pottery, chemicals, iron, and machinery of all kinds, particularly marine steam engines. It has beside distilleries, breweries, dye works, bleach fields, paper mills, and an endless variety of fancy hand-loom fabrics. In and near the city in 1854 there were 95 cotton factories employing 22,000 hands, 7 woollen works with 700 hands, 4 silk factories with 700 hands, 4 flax with 1,300 hands, and 11 calico print-works with 3,000 hands; in all, 121 manufactories with 27,700 persons engaged in the place in the production of textile fabrics, together with the population of the weaving villages for a large circuit around the city, and the factories at Blantyre, Lanark, Rothesay, &c., which are properly included in Glasgow industry. In 1856 the number of spindles employed in cotton spinning was about 1,800,000, consuming annually 120,000 bales of cotton, and supplying 27,000 power looms, which produced daily 670,000 yards of cloth. Embroidery and the manufacture of sewed muslin give employment to a large number of females of the surrounding counties. Glasgow has long been noted for its Turkey-red dyes. The dye works, of all colors, employ 1,000 hands. The iron manufactures are equally important with the textile. Situated in the immediate vicinity of the mineral district, Glasgow has every facility for competing in this branch of production with the most favored localities. The introduction of the hot blast in the process of smelting increased the number of furnaces from 16 in 1830 to 102 in

1854, producing, in the district including Lanark and Ayr, 717,600 tons of pig iron. Five of the 6 forges of malleable iron in Scotland are near Glasgow, and the 6 produce annually 122,400 tons. The district consumes annually 2,500,000 tons of coal. In 1854, the value of the coal and iron industries was £4,872,866, employing 38,908 persons. The St. Rollox chemical works employ 1,000 workmen in the manufacture of soda, bleaching powder, sulphuric acid, &c. There are other chemical factories in which the production of nitric and muriatic acids, chemicals of lead and iron, iodine, alum, potash, cudbear, naphtha, and bituminous oils is carried on. Since the increase of steam navigation the building of steamships and construction of engines has become a large source of industry on the Clyde. This occupation began to develop itself in 1821, and has continued to increase since.—Glasgow has but little history apart from the general history of the country. The Romans had a station on the Clyde in the locality of the city, and Antoninus's wall commenced a few miles W. of it. Local tradition assigns the foundation of Glasgow to St. Kentigern, afterward its first bishop, A.D. 539. William the Lion made it a burgh by royal charter, between the years 1175 and 1178. In 1800 a battle between the Scots under Wallace and the English under Percy was fought in the High street, when Percy was defeated and slain. In 1850, '80, and '81, Glasgow was visited by the plague. About 1543 the regent Arran besieged the earl of Lennox in the bishop's castle, obtained it upon promise of terms, and put the garrison to the sword. The same leaders soon afterward fought a battle at the Butts in the E. part of the city, where the regent gained the victory and plundered the city. In 1560 reformed superintendents superseded Catholic bishops. In 1638 the famous assembly of the Presbyterian church was held, when episcopacy was abjured. For several years thereafter the city was a prey to both parties in the civil wars. Fire, plague, plunder, and famine desolated the place. On June 4, 1690, a charter of William and Mary conferred on the townsmen the right of electing their own magistrates. Glasgow was strongly dissatisfied with the union of Scotland and England, but in 1715 and again in 1745 sided with the house of Hanover and raised a force against the Stuarts, for which the pretender's army on the retreat from Derby levied contributions and threatened to burn it. On the breaking out of the American war Glasgow raised a regiment of 1,000 men, and fitted out 14 privateers carrying 14 to 22 guns each, with an aggregate force of 1,000 men. In 1820 the public peace was disturbed by radical political riots, and in 1848 similar demonstrations were made by the char-  
tists.

GLASS (*Sax. glas*). In chemistry any product of fusion having the peculiar lustre known as vitreous, hard and brittle, whether transparent or not, is called glass. In common use the term expresses the transparent product de-

rived from the fusion of silica with an alkali to which lime or a metallic oxide is added. No material invented by man is to be compared with glass in the service it has rendered. To its aid, applied in a thousand different forms, the sciences, particularly chemistry and astronomy, are essentially indebted for their advancement. It has served alike to bring within the ken of man solar systems too remote for unassisted vision to detect, and to open new worlds of living creatures too minute for their forms to imprint a sensible image upon the delicate mechanism of the eye. Thus has it extended and magnified our conceptions of the universe, and of the power of Him who created it. In every direction we find it in homelier ways applied to add to the physical comforts of man. In his habitations it is used to admit the light of day, while it serves as a screen from the wind and rain and cold. As a mirror it is made to throw back the rays that fall upon it; and perfectly reflect the images of objects, while through its transparent sheets every ray is transmitted; and in the vessels of the laboratory the processes going on in their interior are made sensible to the eye. The purity of its material causes the presence of foreign substances to be instantly detected, and it is consequently the most cleanly substance, and especially suited for vessels for holding and keeping liquids. It resists the action of nearly all the powerful chemical reagents; and but for this substance many of them would never have been known, nor could they now be made and kept.—Nothing is known with certainty respecting the early history of this invention. The fact that glass beads or other ornaments of the same material, imitating precious gems in color and beauty, have been found with mummies more than 3,000 years old, carries back the manufacture in Egypt to a very remote time. At Thebes a bead of material similar to crown glass has been found with the name of a monarch inscribed upon it who lived 1,500 years B. C.; and hieroglyphics, that must be as old as the sojourn of the Israelites in Egypt, represent glass blowers at work much after the fashion of the present day. The passage in Job xxviii. 17 is sometimes referred to as an allusion to this material, but when citing the onyx and the sapphire, the term "crystal" is very likely to have been applied to quartz or amethysts, of which cups were in those days made. In the ruins of Nineveh glass lenses, vases, bottles, &c., have been found; but there is no indication of the use of glass for windows. It is not unlikely that the substance was known long previous to the time when it was produced in beads and lenses and blown into useful shapes; for in extracting the metals of the ancient brass from their ores, and in baking bricks and articles of pottery, the workmen must often have drawn out the glassy cinders into strings, and observed the vitreous glazing produced when the clay was mixed with ashes. The lavas of

volcanoes, too, often presented to them rude forms of glass, exhibiting its plasticity, and the various colors of these artificial and natural products often no doubt suggested the possibility of imitating successfully the precious stones—those true and perfect natural glasses. From such hints the ancient Egyptians probably derived their first knowledge of glass; and profiting by them, they soon reached a high degree of excellence in the manufacture. From them the Phoenicians are supposed to have received the art, little credit being due to the tale of Pliny that it was the invention of some merchants of their nation, who observed the sand upon the beach melted by the fire and forming glass in contact with some lumps of soda. A stronger heat than could be obtained from an open fire would be required to effect this result. Nor is much more credit to be attached to his accounts respecting the production of a glass of malleable character, which when thrown upon the ground was merely indented, and could be restored to shape with a hammer, as if it were brass. Some metallic salts, as chloride of silver, possess ductility at the same time with a glassy appearance, and of one of them the articles referred to may perhaps have been made; but all modern experience is opposed to the possibility of malleability existing in a vitrified body. At Sidon and Alexandria glass works were in operation in the time of Strabo and Pliny; according to Theophrastus, the art was practised 370 years B. C., and the processes of cutting or grinding, of gilding and coloring, were then in use. Articles of exquisite workmanship were produced, but of great cost, and known only as luxuries. Vases and cups, some enamelled and beautifully cut and wrought with raised figures, and some remarkable for the brilliancy of their colors, were furnished to the Romans; and it is said that the tribute from Egypt was required by the emperor Aurelian to be paid in articles of glass. Among the most celebrated of the ancient works in glass is the Barberini or Portland vase, found in the tomb of Alexander Severus, who died A. D. 235. It is of a deep blue color, with raised figures in a delicate white enamel. The manufacture of glass was introduced into Rome in the time of Cicero; and in the 3d century articles of the material were in common use. Utensils of it have been found in Herculaneum, and in one or two instances it has been met with in windows in Pompeii. This, however, is not at the present day a very important use for glass in warm climates; and the Romans, moreover, possessed an excellent substitute for it in sheets of mica, which were in use where a protection of this sort was required. Colored window glass is known to have been used in churches in the 8th century; but for private houses glass long continued to be a rarity, and in England in the 12th century houses provided with glass windows were regarded as magnificent. In the time of the crusades the manufacture of glass was brought from

the East and established at Murano, one of the islands adjacent to Venice. Here it was long successfully prosecuted, being sustained by the fostering care of the government, and its workmen being invested with extraordinary privileges. Glass mirrors were probably first made here, and they became famous all over Europe, gradually taking the place of the mirrors of polished metal which were before in use. Many of the ornamental objects they produced were exceedingly ingenious, and are reproduced and admired even at this day. Such are the glass beads and the Venetian balls lately introduced for paper weights, made by combining together colored pieces of waste filigree glass to imitate the forms of flowers, &c., and introducing these into globes of transparent glass, which are made to collapse upon the designs by the glass blower drawing in his breath, and thus exhausting the air from the globe. The lens form of the outer covering increases the effect by magnifying the object within. The filigree work is produced by glass rods of different colors, which are melted to the outside of lumps of glass when partially shaped into decanters or other vessels. The Venetian frosted glass is an old invention, recently rediscovered by Mr. Pellatt. It is made by dipping the hot glass before blowing into cold water and instantly taking it out, softening it by heat and blowing before the cracks are melted in. The Bohemians next acquired reputation in this art; and owing to the purity of the materials found in abundance in their country, as well as to their skill, their wares still continue famous. The French, perceiving the importance of the business, early imitated the example of the Venetians, and gave extraordinary encouragement to any of the nobility who would prosecute the manufacture. In 1684 attempts were made to produce mirrors from blown glass, as was practised so successfully by the Venetians; but about the year 1666 it was found necessary to procure workmen from Venice. Works were then erected at Tourlaville near Cherbourg, which was selected from the resemblance of the locality to that of the works at Murano. In 1688 Abraham Thevart introduced in Paris the method of making large plates by casting the glass instead of blowing; he thus produced heavy plates measuring 84 inches by 50, while those previously made had barely reached in length the smaller figure named, and were necessarily thin. New works were then established at St. Gobain (in the department of Aisne); and the two companies afterward united their interests. In the 18th century the business became very successful, and has continued so to the present time, the products of the establishment ranking among the first in quality in the world.—The manufacture of window glass, according to an old builder's contract, brought to light by Horace Walpole, and copied into his "Anecdotes of Painting," was conducted in England as early as the year 1489; but a decided preference was given to that "from beyond the seas." It was

commenced in London in 1557; and soon afterward flint glass also was made there. The production of plate glass was undertaken in 1670 at Lambeth by the duke of Buckingham, who imported Venetian workmen. The government encouraged the enterprise by a bounty upon the glass intended for exportation; and under this protection, also extended to the different branches of the manufacture, by which the cost was reduced from 25 to 50 per cent., many other glass factories sprung up in different parts of the kingdom; but their prosperity and the progress of the art were afterward greatly checked by the excise duties imposed, and the surveillance of crown officers over all the operations of the works. The bounties and the duties, with their annoying restrictions, were annulled in 1845, when the suddenly increased demand for home consumption brought into existence many more establishments. In 1847 there were in all 24 window glass factories in Great Britain. In 1858 the number was reduced to 8. The capacity of their production is, however, immense, as is shown by the fact that the firm of Chance and co. executed the large order in sheet glass for the crystal palace in 1851 without materially affecting their ability to fill their general orders. The British exports of glass in 1844 amounted to £26,694 in value; in 1855 they exceeded £500,000. The quality of their crown glass is unrivalled.—Belgium is said to be the greatest glass-producing country in the world. In 1854, as stated by Mr. Hartley of Sunderland, the annual production of sheet glass had amounted to 50,000,000 square feet, or 22,800 tons, which was one fourth more than was made in England of both crown and sheet glass. Of this, 85 per cent. was exported, 6 per cent. being sent to England. Of the English production, 85 per cent. was at that time retained for home consumption.

—Glass appears to have been one of the earliest branches of manufacture introduced into the United States; but to what extent it was carried on in early times is unknown. In Salmon's "Modern History" (London, 1746), vol. iii., p. 440, mention is made of glass works which were commenced at Jamestown, Va., and the completion of which was interrupted by the Indian massacre of March 22, 1622; and in Howe's "Historical Collections of Virginia," p. 39, is a quotation from "Smith, book iv. p. 18," in which, under date of 1615, it is said that "for a long time the labor of the colony had been misdirected in the manufacture of ashes, soap, glass, and tar, in which they could by no means compete with Sweden and Russia." But the first glass factory in the United States of which we have a precise account was built by Mr. Robert Hewes of Boston, Mass., in the town of Temple, N. H., in 1780. From information obtained by Mr. H. A. Blood, the historian of that town, it appears that the works were located there on account of the cheapness of fuel and labor. The building, of which the ruins are still to be seen, was 65 feet square, and the glass blowers, 32 in number, were German (Hessians and Wal-

deckers) deserters from the British army. In the winter of 1780-'81, in consequence of the carelessness of a drunken furnaceman, the works took fire and were destroyed. Some of the manufactured articles, of a greenish color, are still preserved. A large circular plate, the product of the first operations, was presented by Mr. Hewes to Harvard university. To encourage the rebuilding of the works, the state of New Hampshire, on the petition of Mr. Hewes, authorized him, by act of the general court of March 30, 1781, to issue lottery tickets, and by their sale raise the required capital. The attempt, however, was not successful. From an allusion to this subject by Washington in his diary (1789) it would appear that glass was made at that time in New Haven. In 1800 an unsuccessful attempt was made to establish the business in Boston. In 1808 a German named Lint took charge of the Boston works, and the state of Massachusetts agreed to pay the proprietor a bounty on every table of window glass made. Since that time the works have prospered, and many new enterprises have been started, but the greater number of these have been abandoned. The most important flint glass works now in operation are 3 factories in S. Boston, 2 in E. Cambridge, and one at Sandwich, Mass., 2 in Brooklyn, N. Y. (one of plate glass commenced in 1855, but now discontinued), one in Jersey City, and 2 in Philadelphia. In the southern part of New Jersey are the most extensive works producing window glass, and about Pittsburg, Penn., and the river towns below, and also in central New York, the manufacture is carried on in numerous factories. The first plate glass manufactory was established at Oheshire, Berkshire co., Mass., about 1853. The company afterward removed its works to Lenox, in the same county, and is known as the "Lenox Rough Plate Glass Co." It is the only establishment now in operation devoted to this branch. Henry R. Schoolcraft was engaged in his youth in the manufacture of glass at Oheshire, and in 1817 published a treatise entitled "Vitreology," designed to exhibit the application of chemistry to this art.—Glass is a chemical compound of variable ingredients, different substances of similar character replacing each other to produce its varieties. Silicio acid or silica is its principal element, which combines with the potash, soda, oxide of lead, lime, alumina, and other substances that may be added, to produce silicates of these bases. By the manufacturer the bases are classed as fluxes. Boracic acid may take the place of silicio acid to produce vitreous borates or glass. The proportions of the bases named admitting in their use of indefinite variations, a wide scope is given for the exercise of the skill of the manufacturer in producing any particular quality of glass. The metallic oxides also afford him abundant resources for imparting any desired hue to his product, according as these are judiciously selected and introduced. The important requisite in all the varieties of glass is a fusible compound, which solidifies on

cooling into a transparent mass, without assuming a crystalline structure. Such a substance is a product of the process of reducing metallic ores. It results from the earthy matters of the ores and fluxes being of the composition and proportions fitted to melt together into a fluid cinder, leaving the metal, deoxidized by the carbon of the fuel, free from foreign admixture, and in a condition to drop readily through the glassy fluid. The more perfect a glass is thus obtained the more successful is the operation. But the glass is not the ultimate end of the process, and is too variable and uncertain in quality to be converted to useful purposes. The compounds produced by the glass manufacturer range from the most fusible combinations of one part of silica with 2 or 3 of soda or potash, which melt at a cherry red heat and dissolve in cold water, to the hard and refractory silicates of lime and alumina, some of which, as that represented by the formula  $Al_2O_3, 8SiO_2$ , require the powerful heat of a furnace to soften them. Potash especially increases the fusibility of glass; the oxides of lead and of zinc, and to some extent barytes, produce a similar effect, while they also add to its softness, its lustre, its specific gravity, and its power of refracting light, and do not interfere with its perfect freedom from color, unless the lead be used in excess, when it gives a yellowish tinge. Iron, in the state of the silicate of the protoxide, imparts a dark green color; but by the addition of a small quantity of bin-oxide of manganese ( $MnO_2$ ) the color disappears, as the protoxide is converted into the sesquioxide ( $Mn_2O_3$ ), and the manganese, losing one atom of oxygen, becomes  $MnO$ . But if so much bin-oxide has been added that the sesquioxide of this metal is produced, this communicates an amethystine color to the glass. Other metallic oxides, as those of uranium, copper, silver, and gold, are also employed to

give intense colors. Without reference, however, to substances used for imparting or removing colors, or those which may be present by reason of the impurities of the materials employed, as magnesia, alumina, and oxide of iron, the essential materials of the ordinary kinds of glass may be regarded as silica and boracic acid, the alkalies, lime, and oxide of lead. The varieties of glass running into each other, their classification is necessarily somewhat arbitrary. Tomlinson makes this simple division: "1. Silicate of potash and oxide of lead. Examples: flint, crystal, and strass. Flint contains more lead than crystal, and strass more than flint. 2. Silicate of soda and lime; or, silicate of potash, soda, and lime. Examples: common window, English crown, and plate. 3. Silicate of potash and lime. Examples: foreign crown, refractory Bohemian glass. 4. Silicates of soda, lime, alumina, and oxide of iron. Example: coarse green wine bottle glass." The arrangement of Dr. Knapp is as follows: 1. Bottle glass, including the varieties worked into hollow vessels and tubes, as common bottles, glass for medicinal bottles, white bottle glass for vials, tumblers, tubes, &c. The dark-colored varieties are distinguished for their large proportion of oxide of iron and alumina, and none contain oxide of lead. The white bottle glass contains silica, soda or potash, and lime. 2. Window glass, including English crown and cylinder or sheet glass; this is a silicate of potash or soda, lime, and alumina. 3. Plate glass, differing from the preceding only by the greater purity and freedom from color of the materials. 4. Flint glass, used for grinding, &c., composed of silica, potash, and oxide of lead. 5. Crystal, for optical purposes and table ware, consisting of silica or boracic acid, potash, and more lead than the preceding. 6. Strass, the paste used for imitations of precious stones; it contains much oxide of lead, and also metallic oxides used for the

ANALYSES OF GLASS (from Dr. Knapp's "Chemical Technology").

Variety of glass.	No.	Analyst.	Silica.	Potash.	Soda.	Lime.	Magnesia.	MnO.	Alumina.	Oxide of iron.	Oxide of lead.	Proportion.
Bottle glass, French.....	1	Berthier ..	60.00	8.10	....	22.80	..	1.2	8.00	4.00	..	5:3
" " ".....	2	" " ".....	59.60	8.20	....	18.00	7.0	0.4	6.80	4.40	..	7:3
" " ".....	3	Dumas ....	58.55	5.48	....	29.22	..	..	6.01	5.74	..	2:1
" " ".....	4	" " ".....	45.60	6.10	....	28.10	..	..	14.00	6.20	..	4:8
Medicinal glass, French.....	1	Berthier ..	69.60	8.00	....	8.00	18.00	0.6	..	3.60	..	1.60 9:9
" " ".....	2	" " ".....	62.00	....	16.40	15.60	2.2	..	2.40	..	..	6.70 5:1
Window glass, French.....	1	Dumas ....	69.25	....	11.80	17.25	..	..	2.20	..	..	4:1
" " ".....	2	" " ".....	68.50	....	18.70	7.60	..	..	10.00	..	..	7:2
" " English.....	3	Richardson	66.87	....	14.22	11.88	..	..	8.16	..	..	7:3
" " ".....	4	Cowper ..	71.40	....	15.00	12.40	..	0.8	0.60	0.30	..	9:3
Plate glass, French.....	1	Berthier ..	72.00	....	17.00	6.40	..	..	2.60	1.90	..	6:1
" " ".....	2	Dumas ....	73.85	5.50	12.05	5.60	..	..	3.50	..	..	7:1
" " Venetian.....	3	Berthier ..	68.60	6.90	8.10	11.00	2.1	0.1	1.20	0.80	..	5:1
White glass, goblet, Bohemia.....	1	" " ".....	71.70	12.70	2.60	10.80	..	0.3	0.40	0.30	..	6:1
" " French fusible tubing.....	2	" " ".....	69.20	15.80	8.00	7.60	2.0	..	1.20	0.50	..	4:1
" " crown.....	3	Dumas ....	62.80	22.10	....	12.50	..	..	..	2.60	..	5:1
Crystal, London optical.....	1	Berthier ..	59.20	9.00	....	..	..	1.0	..	0.40	98.20	8:1
" " Newcastle.....	2	" " ".....	51.40	9.40	....	..	..	..	1.20	0.80	87.40	6:1
" " England.....	3	Faraday ...	51.92	13.67	....	..	..	..	..	..	83.25	6:1
Flint glass, Guinand.....	1	" " ".....	44.80	11.73	....	..	..	..	..	..	48.05	9:3
" " ".....	2	Dumas ....	42.50	11.70	....	0.50	..	..	1.60	..	48.50	4:1
" " strass.....	3	" " ".....	38.50	7.90	....	..	..	..	1.00	..	58.00	7:3
" " enamel.....	4	" " ".....	31.60	8.80	....	..	..	..	..	Ox. tin.	50.80	7:3
Bohemian hard glass tubing.....	1	Rowney ...	73.00	11.50	8.00	10.50	..	2.0	..	..	..	6:1

\* Relation between the oxygen of the acid and the total amount of oxygen in the bases.

colors. 7. Enamel, composed of silica, soda, and oxide of lead, but rendered opaque by oxide of tin or antimony, which form a stannate or antimoniate with the soda. To these may be added the soluble glass, which is a simple silicate of soda or of potash, or a mixture of the two silicates. The chemical formula of bottle glass No. 4 (see table on preceding page) is  $\text{KO} + 8\text{CaO} + 2\text{Al}_2\text{O}_3 + \text{F}_2\text{O}_3 + 8\text{SiO}_2$ ; of window glass No. 1,  $8\text{NaO} + 5\text{CaO} + 12\text{SiO}_2$ ; of plate glass No. 1,  $2\text{NaO} + \text{CaO} + 6\text{SiO}_2$ ; of white glass No. 3,  $\text{KO} + \text{CaO} + 8\text{SiO}_2$ ; of flint glass No. 2,  $6\text{KO} + 9\text{PbO} + 20\text{SiO}_2$ ; of strass (flint glass No. 3),  $3\text{KO} + 9\text{PbO} + 16\text{SiO}_2$ . The last variety, well known to chemists, is of variable composition, some qualities melting readily. To the later editions of Dr. Knapp's work are added the following more recent analyses by Peligot:

Varieties of glass.	Silica.	Potash.	Lime.	Alumina.	Soda.	Oxide of tin.	Oxide of lead.	Met. copper.	Oxide of iron.
Bohemian .....	76.0	15.0	8.0	1.0	..	..	..	..	..
Bohemian opal glass ..	80.9	17.6	0.7	0.8	..	..	..	..	..
Venetian Aventurine ..	67.1	5.5	8.9	..	7.1	2.3	1.1	3.9	3.5
Bohemian mirror .....	67.1	21.0	9.9	1.4	..	..	..	..	..

The second of these is a remarkable glass, being a simple silicate of potash with 10 per cent. more silica than is contained in Fuchs's soluble glass (a notice of which is introduced near the close of this article). Particles of glass are dispersed through the semi-transparent, imperfectly melted mass. The compound is not attacked by boiling water, and does not attract moisture from the air. The ingredients of glass appear to be in the proportions of chemical equivalents—results, however, obtained by practice and not by mixtures made with this view. Various causes affect the stability of the combinations and the qualities of the compounds. The alkali in window glass powdered and moistened is detected by its action upon turmeric paper, and may be partially dissolved out by long continued digestion in boiling water. Atmospheric agents sometimes remove it in part from window panes, leaving a film of silica or silicate of lime. The glass of stable windows is liable to change its appearance, and assume prismatic colors, from the action of the ammoniacal vapors upon the silica. Changes in the degree of oxidation of its metallic ingredients, which are sometimes induced by atmospheric causes, are also attended by changes of colors. Long continued cooling has the effect of changing the structure, causing it to lose its transparency and become devitrified. Its ingredients form among themselves a new arrangement of their particles, and compounds are produced which assume a crystallized structure. By remelting, the vitreous character may be restored, though with a loss of a portion of potash which was volatilized in the devitrification. In making articles of glass, and especially bottles, it is necessary to guard against this tendency to crystallize, and shorten the process of annealing on account of it. Devitrified glass was first

described by Réaumur, and has hence been called Réaumur's porcelain. In consequence of the ease with which it may be made into any shape, and its tenacity and refractory nature, not unlike porcelain itself, it has been thought that it may be employed as a cheap substitute for this material, especially in many articles used in chemical laboratories.—The specific gravity of glass varies with its composition, from 2.4 to about 8.6. The determination of this may afford some hints as to the composition of crystal or flint glass, but is no index to that of the other varieties. Its density and also its refractive property are increased with the proportion of oxide of lead it contains. Brittleness is a quality that limits the alteration of the shape of glass within narrow bounds, after it has cooled; but when softened by heat while it is highly tenacious, no substance is more easily moulded into any form, and it can be blown by the breath into hollow vessels of which the substance is so thin that they may almost float in the air. It may also be rapidly drawn out into threads of several hundred feet in length; and these have been interwoven in fabrics of silk, producing a beautiful effect. In the soft plastic state it may be cut with knives and scissors like sheets of caoutchouc. It is then inelastic like wax; but when cooled, its fibres on being beaten fly back with a spring, and hollow balls of the material have, when dropped upon the smooth face of an anvil from the height of 10 or 12 feet, been found to rebound without fracture to  $\frac{1}{2}$  or  $\frac{1}{3}$  the same height. It has the valuable property of welding perfectly when red hot, and portions brought together are instantly united. When moderately heated it is readily broken in any direction by the sudden contraction caused by the application of a cold body to its surface. It is also divided when cold by breaking it along lines, cut to a slight depth by a diamond, or some other extremely hard-pointed body of the exact form suited for this purpose; and it may be bored with steel drills, provided these are kept slightly moistened with water, which forms a paste with the powder produced. Oil of turpentine, either alone or holding some camphor in solution, is also used for the same purpose. Copper tubes fed with emery also serve to bore holes in glass. Acids and alkalies act upon glass differently according to its composition, and reference should be made to this in storing different liquids in bottles. Silicate of alumina is readily attacked by acids, and bottles in which this is in excess are soon corroded even by the bitartrate of potash in wine, and by the reaction the liquor itself is contaminated. A glass that loses its polish by heat is sure to be attacked by acids. Oxide of lead when used in large proportion is liable to be in part reduced to a metallic state by different chemical reagents, and give a black color to the glass. All glasses are attacked by hydrofluoric acid.—The crude materials employed in the manufacture of glass are selected with more or less care according to the quality of the

articles to be produced. Silica is obtained in the form of quartz sand from sea beaches and from the disintegration of quartzose rocks in the interior. It was in England once procured from flints calcined and ground to powder, whence the name flint glass. Sand is now used instead, and a highly prized article is imported into England from Australia. In the United States the purest is from Lanesborough, Mass. It is disintegrated quartz rock, a member of the metamorphic group. As quarried, it retains the marks of stratification, and thin films of white talc coat its seams. It is easily broken down by the pick, and lumps of it are crushed in the hand. The sand is washed in a stream of water to separate the talcose impurities, and is then ready for the market. The grains are remarkable for their purity; in the mass they appear white, but under the microscope each grain is limpid like a clear quartz crystal. This sand is suitable for the best flint and plate glass. Other qualities are procured in various parts of the country. Lime may be used either in the state of quicklime or in limestone of the purest qualities. Common wood ashes have been used to furnish potash, and ashes of sea plants to furnish soda; but these have been replaced by the crude alkalis obtained from them and other sources, and for some purposes the refined pearlash is employed. The carbonate of soda is also extensively prepared from common salt; and at Newcastle, England, black bottles are made from rock salt and sand from the bed of the river, with carbonate of lime of the soap works and the tank waste of the alkali makers. Sulphate of soda, the waste product of many chemical works, is successfully used, except for plate glass. Of the oxides of lead, the minium, or red lead ( $Pb_3O_4$ ), is preferred to the litharge ( $PbO$ ), on account of its finer state of division and the beneficial effects of the excess of oxygen, which carries off with it any carbonaceous impurities or particles of soot that may be present in the melted mass. Saltpetre and bin-oxide of manganese and arsenic also are often introduced into the mixtures with the view of promoting the same object. Alumina and oxide of iron are commonly not intentionally used; they come from the impurities of the other materials. Waste glass, called cullet, forms a considerable proportion of the raw materials in some works; it promotes the fusion and the chemical union of the silica and bases mixed with it, but must be well sorted, so that no qualities be introduced inferior to that intended to be made. Feldspar, which contains the essential elements of glass, is recommended to be used as one of the raw materials. Basalt also might no doubt be made to serve a useful purpose, as the lavas of the extinct volcanoes of central France were successfully employed in the last century in the manufacture of glass bottles. The following receipts give the proportions of the ingredients used for various kinds of glass at different works; 100 lbs. of sand being employed in all cases where it is not specified:

**ORDINARY FRENCH BOTTLE GLASS**—Varec, 30-40 lbs.; lixiviated ashes, 160-170; fresh ashes, 30-40; clay containing iron, 30-100; broken glass, 100.

**ENGLISH BOTTLE GLASS**—Lixivated ashes, 100 lbs.; kelp, 40-90; wood ashes, 30-40; clay, 50-100; cullet, 100.

**CHAMPAGNE BOTTLES**—Feldspar, 200 lbs.; lime, 20; common salt, 15; iron slag, 125.

**ORDINARY GREEN BOTTLE GLASS**—Lime, 73 lbs.; lixiviated wood ashes, 230-275.

**DARK GREEN BOTTLES**—Dry Glauber's salt, 20 lbs.; soap boiler's flux, 18; Scheffel (Pruss.) lixiviated ash, 1; glass from the hearth, 30; green cullet, broken glass, 179; isalt, 45.

**APOTHECARIES' VIALS**—Potash, impure, 30-35 lbs.; lime 17; ashes, 110-120; bin-oxide of manganese (cullet), 0.25-0.54.

**BOHEMIAN CRYSTAL FOR GRINDING**—Purified potash, 6-8 lbs.; chalk, 8; broken glass, 40; manganese, 0-73.

**SEMI-WHITE**—Crude soda, containing lime, 100 lbs.; cullet, 100; manganese, 0.5-1; or, potassa, 30; lime and decolorizing matters, 13.

**CLEAR WHITE**—Calcined potash, 65 lbs.; fullers' lime, 4; white cullet, 100; manganese, 0.5.

**WHITE (for chemical purposes)**—Potash, 41.4 lbs.; lime, 17.3.

**WINDOW GLASS, FRENCH**—Sand, 100 lbs.; chalk, 35-40; dry carbonate of soda, 28-35; broken glass, 60-150; manganese, 0.25; arsenic, 0.20; of the last two, sometimes much more.

## WINDOW GLASS, FRENCH.

Materials.	No. 1, lbs.	No. 2, lbs.
Sand .....	100	100.0
Dry sulphate of soda .....	44	53.0 to 73.0
Charcoal in powder .....	4	4.5 to 5.5
Slaked lime .....	6	13.0 to 15.0
Broken glass .....	20 to 100	25.0 to 100.0

## WINDOW GLASS, ENGLISH.

Materials.	No. 1, lbs.	No. 2, lbs.	No. 3, cwt.
Sand .....	560	448	16.00
Chalk .....	154	146	5.00
Carbonate of soda .....	119	168	5.00
Sulphate of soda .....	68	17	1.25
Arsenic .....	2	2	.....
Cullet .....	448	448	16.00

## PLATE GLASS, ST. GOBAIN.

Materials.	No. 1, lbs.	No. 2, lbs.
Pure sand from Senlis .....	100	100
Pure salts of soda .....	35	60
Lime crumbled .....	5 carb.	18
Broken glass .....	100	100
Decoloring matters .....	.....	110, 0.5 small.

**PLATE GLASS, ENGLISH**—Lynn sand, washed and dried, 730 lbs.; alkaline salt, containing 40 per cent. of soda, 430; lime, slaked and sifted, 60; nitre, 25; broken plate glass, 425; product, 1,200 lbs. of glass.

**FLINT GLASS, ENGLISH (A. Pellatt)**—Carbonate of potash 175 lbs.; red lead or litharge, 224; sand, washed and burned, 386; saltpetre, 14-28; oxide of manganese, 0.25-0.75; broken glass, *ad libitum*.

## FLINT GLASS, FRENCH.

Materials.	Summer use, draft poor.		Coal for fuel.	Wood for fuel.
Pure sand .....	300	300.00	100	100
Minium .....	215	190.00	70	45
Purified potash .....	110	120.00	30	35
Nitrate of potash .....	10	.....	.....	.....
Borax .....	12	.....	.....	.....
Cullet .....	.....	300.00	.....	.....
Arsenious acid .....	.....	0.45	.....	.....
Oxide of manganese .....	.....	0.60	.....	.....

## OPTICAL GLASS, BONTEMS.

For flint glass.		For crown glass.	
Sand .....	48.5	Sand .....	60
Red lead .....	48.5	Carbonate of soda .....	35
Carbonate of potash .....	10.0	Carbonate of lime .....	14
Nitrate of potash .....	8.0	Arsenic .....	1

**OPTICAL GLASS (Faraday's heavy)**—Protioxide of lead, 164 lbs.; silicate of lead, 24; dry boracic acid, 25.

STRASS, THE BASIS OF ARTIFICIAL GEMS.

Materials.	No. 1.	No. 2.	No. 3.
Ground quartz crystal, or pure sand	100.0	100.0	100.00
Pure minium.....	156.0	.....	154.00
White lead.....	.....	171.0	.....
Pure caustic potash.....	54.0	82.0	54.00
Boric acid.....	7.0	9.0	6.00
Arsenious acid.....	0.8	0.8	0.16

The proportions given in the above receipts are variously modified by different manufacturers. Compounds will not produce the same results in all furnaces, nor in the same furnace under different conditions of draft, fuel, weather, &c. As in the smelting of ores, a skilful manufacturer will know how to vary the charges to suit circumstances.—The fuels used for melting glass may be bituminous coal or its coke, thoroughly seasoned wood, and perfectly dry peat. Pine wood is preferred to the harder kinds; and all are improved by kiln drying, carried to the point of browning the wood. Rosin is used in some American works to the exclusion of other fuel; it is pulverized and added in small quantities at a time, leaves no residuum in burning, and does not produce any impurities that can mix with or injure the glass. The raw materials, thoroughly ground, mixed together, and sifted, are well incorporated with from  $\frac{1}{4}$  to  $\frac{1}{2}$  of their weight of broken glass before being introduced into the melting pots. These are already heated to a white heat in the furnace, and receive only  $\frac{1}{4}$  of a charge at a time, more being added as the first portion melts down. The pot being at last filled with the melted "metal," the fires are vigorously pushed, and the progress of the operation is judged of by the workmen dipping iron rods from time to time into the mixture and examining the appearance of the drops withdrawn. A nearly homogeneous product, which becomes transparent on cooling, indicates that the most refractory ingredients have been all dissolved. Their mixture has been facilitated by the continual disengagement of carbonic acid gas, which in its escape caused the whole to be thrown into ebullition. Some of the gas remains in the mass, rendering it spongy and full of vesicles. Unless in the manufacture of the finer qualities of glass, for which the purest materials are employed, there is also a scum, called glass gall or sandiver, floating upon the surface, consisting of the insoluble matters, and the sulphates of soda and lime not taken up by the mixture. This is removed by lading, and the "metal" is next fined, which is done by increasing the heat to the highest degree, and keeping the contents of the pots in a state of perfect fluidity from 40 to 48 hours; in this time the bubbles disappear and the insoluble matters settle to the bottom. The furnace is then allowed to cool until the metal has become viscid, so that it may be taken out and worked; and it is afterward kept at sufficiently high temperature to maintain the glass in this condition, that it may be used as required. The arrangements of the great circular glass furnaces, with their central

fire surrounded with 8 to 12 pots, each reached by its own arch under the general dome, admit of enough material being melted at once to employ all hands the first 4 working days of the week, the men working day and night in 6 hour shifts. The materials of the furnaces and pots, calculated to withstand the excessive heat and the action of the various melted ingredients, must of course be carefully selected from the most refractory substances, and the work must be most skilfully executed. The construction of the great melting pots is an object of special solicitude, and the placing of a new one in the furnace while this is in operation is a task of no little apparent difficulty and danger.—Such is a mere outline of the means employed to bring the materials of glass into their desired combination. The production of each kind of glass is a separate branch of manufacture, involving many curious details and processes, too numerous even to be named in this account, and all dependent upon illustrations for an intelligible description. The tools employed are few and simple, and differ but little from those described in the work of Blancourt, "On the Art of Glass," published in London in 1699. The first in importance is the pipe or blowing tube, made of wrought iron, 4 or 5 feet long, with a bore from  $\frac{1}{4}$  to 1 inch in diameter, a little larger at the mouth end than at the other. It is a long hand, with which, the end being heated red hot, the workman reaches into the pot of melted matter and gathers up the quantity he requires, and which afterward holds the article in the manipulations to which he subjects it; and it is at the same time the air tube through which the breath is forced to expand the vessel, or through which water is sometimes blown to produce the same effect by the steam it generates. A solid rod of iron, called a ponty or pontil, serves to receive the article upon its end when freed from the pipe, adhesion being secured by the softness of the glass or by a little red-hot lump already attached to the pontil. Spring tongs, like sugar tongs, are used to take up bits of melted glass; and a heavier pair, called pucellas, furnished with broad but blunt blades, serve to give shape to the articles as the instrument in the right hand of the workman is pressed upon their surface, while, seated upon his bench, he causes with his left hand the rod holding the article to roll up and down the two long iron arms of his seat, upon which it is laid horizontally before him. The operation is like the shaping of clay vessels upon the potter's wheel, the pipe or the pontil serving in the place of the wheel or of a lathe. It is more complicated, as the vessel is also shaped from the interior as well, and is occasionally applied to the opening of the furnace to soften it entirely or only in some part to which greater distention is given by blowing. Another important instrument is a pair of shears, with which a skilful workman will cut off with one clip the top of a wine glass, as he twirls it round with the rod to which it is attached held in the left



hand. The edge softened in the fire is then smoothed and polished. Beside these a wooden utensil called a battledoor is employed, with which the glass is flattened by beating when necessary; compasses and calipers and a measure stick are at hand for measuring; and a slender rod of iron forked at one end is used to take up the articles, and carry them when shaped to the annealing oven, in which they are left for some time to be tempered. (See ANNEALING.) The marver (Fr. *marbre*, marble) is a smooth polished cast iron slab, upon the surface of which the workman rolls the glass at the end of his tube in order to give it a perfectly circular form. Those used in the manufacture of common black bottles are furnished on one edge with several concavities, in which the mass of metal taken from the melting pot is first roughly shaped as it is rolled over and over and made to swell by gentle blowing. The fine ornamental bottles of flint glass are shaped more completely by blowing them in moulds of brass or iron, which are made in two parts hinged together, so that they may be opened and shut with the foot. Bottles for champagne and aerated waters are made of extraordinary strength, and are sometimes tested by the pressure of water before using. They ought all to be able to support a pressure of from 25 to 35 atmospheres; some have been known to withstand a pressure of more than 40 atmospheres, or more than 600 lbs. on the square inch.—The method of drawing out tubes affords an interesting and not very familiar example of the curious and ingenious manipulations in the making of this substance. The workman, called the gatherer, introduces the red-hot end or nose of the blowing tube into the pot, and gathering up a portion of the metal, takes it out, suffers it to cool a little, and blows into it, to make it swell. Another dip accumulates more, and so on till enough is gathered. This being then blown into a globular form with very thick walls, the pontil, by means of a lump of melted glass at one end, is secured by another workman exactly opposite the tube, the two lying in one line, which passes through the centre of the globe. The two men then separate from each other as quickly as possible. The globe immediately contracts across its centre, which, being drawn out to the size of the tube desired, cools, so that the hotter and softer portions next yield in their dimensions, and so on until a tube of 100 feet or more in length hangs between the two men, sagging in the middle like a heavy rope. It is kept constantly rotating in the hands, and is straightened as it cools and sets by placing it on the ground. It is cut into suitable lengths while hot by taking hold of it with cold tongs. The diameter of the bore retains its proportion to the thickness of the glass; hence thin tubes must be drawn from globes blown to large size, or from small ones containing very little metal.—Tubes thus drawn out from colored glass are converted into beads

by processes which further illustrate the various and curious manipulations of this art. This branch of the manufacture is extensively practised at Murano. The tubes are drawn out 150 feet in length, and to the diameter of a goose quill; those for the smallest beads by the workmen receding from each other at a pretty rapid trot. The tubes are cut into lengths of about 27 inches and assorted for size and color. Women or boys then take several together in the left hand, and run them on the face of an anvil up to a certain measure, and with a blunt steel edge break off the ends all of the same length, which is commonly about twice the diameter of the tubes; the bits fall into a box. These are next worked about in a moistened mixture of wood ashes and sand, with which the cylindrical pieces become filled; and they are then introduced with more sand into a hollow cylindrical vessel, which is placed in a furnace and made to revolve. The glass softens, but the paste within the bits prevents their sides from being compressed; they become spherical, and their edges are smoothed and polished by the friction. When taken from the fire and cleaned from the sand, they are ready to be put up for the market.—Glass for window panes, commonly known as English crown glass, is one of the hardest varieties, and of unsuitable quality for shaping into vessels or manufacturing by cutting or grinding. In making it, the glass is first blown into a globe, and this is flattened out into a circular disk, which is afterward cut up into panes. The workman learns by experience to gather upon the tube the exact quantity of glass required, which varies not over an ounce, more or less, from 9 pounds. The pipe being cooled to admit of handling, the lump is rolled upon the marver to give it a conical form, and a boy blowing at the same time through the tube causes the glass to swell. It is now heated by holding it in the furnace, and is then again rolled and enlarged by blowing. The most of the glass is worked down to the end of the conical or pear-shaped lump, the upper part being hollow. The solid end is called the bullion. This being softened in the furnace, the tube is laid across a rest and twirled around, while the glass is blown into a globe. The heavy soft end is moreover supported by a boy, standing opposite to the man who blows, and holding it up by the end of an iron rod placed in line with the blowing tube. The globe at the end of the tube is now pointed toward the flame of the furnace, and being constantly twirled, the extreme end toward the fire flattens out, the bullion point still forming a prominence of thicker metal in the centre. To this centre a pontil with a lump of molten glass at its end is next attached, and the blowing pipe is separated by applying a piece of cold iron around the nose. As it breaks away it takes a portion of glass with it, leaving a circular opening. Taken up by the pontil, the glass is held with the nose (or portion to which the blowing pipe had been attached) presented to the so called nose hole

of the furnace. Here it is softened almost to melting, while it is all the time twirled around; it is then presented to the flame issuing from the great circular opening of the so called flashing furnace, the man holding it being protected from the fire by a covering over his head and face. Rapidly revolving in this flame, the opening in the end grows larger; the heated air within prevents the two opposite faces of the flattened spheroid from coming together, and the centrifugal force is constantly enlarging its diameter. The opening rapidly increases, the portion next the fire seems to roll inside out; a glimpse is caught of a large circle with a double rim; and in an instant it has burst open into a flat circular disk with a noise like that produced by suddenly opening a wet umbrella. The disk removed from the fire is kept rapidly revolving until it is cool enough to retain its form. The pontil is then cracked off, and the disk or table is removed upon a fork to the annealing oven and set up on edge with the rest, arranged in rows and supported by iron rods so as not to press against each other, and the thicker part in the centre, called the bullion point or bull's eye, also keeping the tables apart and open for the circulation of air. The annealing is completed in from 24 to 48 hours. Tables are thus commonly made of 52 inches diameter; but some have been produced of 70 inches, and some were exhibited by the Messrs. Chance in the great exhibition of 1851 of 66 inches diameter. A single pot containing half a ton commonly produces 100 tables; and in the crown glass houses it is customary to empty 8 such pots in 3 days every week. From the annealing kiln the tables are taken to the warehouse and sorted according to their different qualities and defects. Each one is then laid in turn upon a "nest" or cushion, and is divided by the diamond into two pieces, the larger one containing the bull's eye. These are next cut up into rectangular panes. The shape and the bull's eye involve considerable waste in cutting; but the remarkable brilliancy of the glass compensates for this loss. The best used for windows, excepting plate glass, is the English crown glass, made as above described; until the year 1838 it was the only kind successfully made for this purpose in England. Another process was in use on the continent, by which a coarser article, known as spread window glass, cylinder glass, &c., was made; and this method being introduced by the Messrs. Chance and co. of West Bromwich, near Birmingham, in 1832, was in a few years perfected, to the great improvement of the manufacture. The process, however, can hardly be called new, for in the *Dictionarium Artisem Schedula*, a work probably of the 18th century, it is described; and it was practised in England and given up for the rotary method at a very early period, as this on the continent was abandoned long ago for the other. The same material is used in both cases; but by converting the glass spheroid into the form of a cylinder, cutting off or bursting open the ends of this,

and with a pair of shears or other method alitting the cylinder its whole length, a broad sheet of glass can then be spread out, making a much larger pane than can be procured by the rotary process. Of crown glass it is difficult to obtain panes of 84×22 inches; but the common size of sheet glass, as the cylinder glass is called, is 47×82 inches, and it is sometimes made 50×36. Cylinders indeed have been blown 77 inches long, requiring a lump of glass of 38 lbs. weight. To obtain the cylindrical form the following method is practised, and usually by a number of workmen together, each at his own furnace hole, of which 10 are sometimes ranged side by side with a raised platform extending in front of each furnace 10 feet above the bottom. Standing upon this, each man gathers a proper quantity of metal, and getting it first into a spheroidal state by blowing and applying the lump to a wooden mould, he holds it after reheating vertically over his head, that the sphere may flatten down, still blowing into the tube. The tube is then brought down, and swung in the pit below the platform, so that the glass may elongate into the form of a cylinder, the blowing being continued; and if the extension takes place too rapidly, it is again held up inverted. Thus the operation is dexterously managed until the cylinder obtains its full dimensions of about 47 inches long, and 10 to 11 inches diameter. The closed end being softened by holding it to the fire, and the pipe being closed by the thumb at the same time, the air within is expanded by the heat and bursts that end open. The edges are next brought out to the full diameter and trimmed. The tube end is cut off when the glass is cool by the application of a red-hot curved iron around its surface, and letting fall a drop of water upon the heated line; and the cylinder is split either in a similar way or better by the diamond, which is applied along a rule laid inside the cylinder. The cylinders are now taken to the flattening furnace, and introduced one by one upon a spreading plate or flattening stone, the slit uppermost. Here as they soften they open out in a sheet, the workman introducing an iron rod, and with it aiding the movement; with another rod, having a block of wood at its extremity for polishing the sheet, he next works down the protuberances and irregularities of the surface. The sheet is then passed into the adjoining oven for annealing. In every one of the processes to which it has been subjected, it was exposed to some imperfection, and some of the sheets bear the peculiar defects of them all, and are worthless; others answer for inferior uses, and but few are perfect; none have the brilliancy of crown glass, and the effect of the unequal lengths of the inner and outer surfaces of the cylinder is to produce a kind of undulating appearance called cockles, which distorts objects seen through the glass. The uneven surface of the sheets rendered attempts to polish the glass unsuccessful, until the ingenious method devised by Mr. James Chance was applied to

this purpose. Each sheet was laid and pressed upon a sheet of soft leather, which, acting as a "sucker," adhered to the glass by atmospheric pressure. Two plates thus treated were laid face to face, and by ingenious machinery rapidly rubbed with the intervention of polishing sand and water. After the removal of the leather the sheets by their elasticity regained their former somewhat curved surface, but in the mean time the faces were thoroughly polished and made as beautiful as plate glass. Excepting for mirrors, the cheap glass thus made is equal to the most expensive kinds. The Venetian method of polishing the great mirrors by imbedding them in plaster of Paris admitted of their being ground to a perfect level and acquiring a brilliancy equal to that of the cast plate. The practice was extended into Bohemia and Bavaria, and is now carried on in Germany, and was applied to plate window glass of moderate sizes. The introduction of soda ash about the year 1885, for the sake of economy in fuel by the greater fusibility it caused in the glass, gave it the bad quality of "rusting," or becoming dull by exposure to the air, rendering it unfit for windows. One German factory alone retains the old practice, and supplies the fine plate glass for the house of Messrs. Roosevelt and son of New York. Sheet glass manufactured by Messrs. Chance and co. was used for the building of the great exhibition of 1851. The cylinders when flattened cut 49×30 inches, and were subdivided into 8 panes of 49×10. The number of these required was about 300,000, of more than 400 tons weight. The setting of them was accomplished as rapidly as their manufacture. In one week 18,392 panes were set by 80 glaziers, and one man set 108 panes in a single day.—Plate glass, largely used for mirrors, and of late for windows also, is now made, as already mentioned, by casting. The mixtures employed do not vary much from those for making sheet glass, except by the introduction of a considerable proportion of soda, which has the effect of making the compound more fluid, but it is apt to impart to it also a greenish or bluish tinge. The greatest care is required in the selection and preparation of the materials to insure a pure and transparent glass free from all defects which tend to refract or reflect the light irregularly and distort the image. As the glass is melted in the pots it is ladled into cisterns or *cuvettes*, placed in the fire by the side of the pots, or, as in Berkshire, Mass., the pot is raised and emptied directly upon the casting table. In France 16 hours are allowed for the melting, and the same time for the metal to remain in the *cuvettes*; but the latter term is sometimes extended to 24 or even 48 hours, the object being for the aeriform bubbles to escape, and the excess of soda to be volatilized. Toward the last the temperature is allowed to fall, and the glass then acquires the slight degree of viscosity suitable for casting. The annealing furnace is at the same time heated, and the metallic plate or table upon which

the glass is to be cast is covered with hot coals for the same purpose. This important part of the apparatus used formerly to be made of bronze; and the great slab of St. Gobain of this alloy weighed 50,000 lbs., and cost 100,000 francs. The British plate company found cast iron less liable to crack, and this metal is now used for the purpose. At the Thames plate glass works the tables are 20 feet long, 11 broad, and 7 inches thick. The extent of the foundry room at Ravenhead is said to be 339 by 155 feet, the furnaces occupying the centre, and the annealing ovens ranged along the sides in front of the furnaces. Each oven is 16 feet wide and 40 feet deep; and its floor is level with the surface of the casting table. The cistern of melted glass taken from the furnace is swung by a crane and carried to the casting tables, the surface of which is carefully cleaned. The melted glass is skimmed with a copper blade, and the cistern being then hoisted to a proper elevation it is cantoned over, and the glass is poured out over the table; ledges of metal around the sides prevent its flowing over, and by their height regulate the thickness of the glass. A copper cylinder 8 feet in diameter extends across the table, resting on the ledges; and being rolled forward, it sweeps before it the excess of glass, and spreads it in a sheet of uniform thickness. The operation is a beautiful one from the brilliancy of the great surface of melted glass and the play of colors exhibited upon it after the passage of the roller. The plate being trimmed of the superfluous glass around its edges, and the back end being turned up like a flange, an iron rake-like instrument is applied to it, by which the plate is thrust forward upon the sanded brick floor into the annealing oven, the temperature of which is that of dull redness. By the force thus exerted the upper surface is somewhat wrinkled, but the marks of this disappear in the subsequent polishing. Another plate is now immediately cast upon the hot table, and the annealing oven when filled is closed up and left for 5 days or longer to cool; in France less time is given to this process. When removed from the oven the plates are carefully examined to see how they will cut to best advantage and avoid the parts which exhibit defects. They are cut in squares with a diamond, and the roughness of the edges is removed with a pair of pincers. Different methods of grinding and polishing the plates are in use, the most approved of which is a late American invention introduced into England in 1856, and adopted in the British plate glass works. A circular plate of cast iron, sometimes 10 feet in diameter and 2 inches thick, is secured upon the upper end of a vertical shaft, so as to revolve with it. Above the table frames are arranged to hold the plates of glass, which are laid in a bed of plaster of Paris, with the face to be polished resting upon the table. These frames also revolve on their centres by the friction of the table upon the glass, of course slowly, but so as to present each side of the plates they

hold to an equal amount of rubbing as they are moved nearer to the centre of the table or further from it. Sand is used to grind down the glass, and this is fed from a box above as required. The grinding by this process is found to be even and equal, and the machinery to work smoothly and steadily from the facility with which the plates accommodate themselves to the power applied. In other operations one plate has been ground upon the face of another, being turned over and ground on their opposite sides when the first are completed. After grinding they are smoothed with emery powder of finer and finer qualities, and are thus prepared for polishing. This is accomplished in the American machine by having the cast iron table covered with rings coated with felt, which are screwed to its surface. The polishing material applied to the felt is oxide of iron or rouge. Polishing sometimes brings out defects which were before concealed; the plates are consequently again assorted, and, if need be, reduced to smaller sizes. (For the methods of silvering them, see MIRROR.) Bending the large plates or the smaller sheets of glass for the purpose of fitting them for bow windows, &c., is an especial branch of the manufacture, more extensively practised at the works of Messrs. Cooper and Belcher at Newark, N. J., than elsewhere. A core of refractory material and suitable shape is introduced upon the floor of the furnace; and upon this is laid the sheet to be bent, which as it softens by gravity conforms itself to the shape of the bed upon which it is laid.

—Of the various kinds of glass in common use, none require more care to insure the purity of the materials employed than the crystal or flint glass, of which are made many choice articles for domestic purposes, some of which are subjected to the processes of cutting or grinding and polishing. It possesses the properties of great transparency and high refractive power, which fit it for lenses for optical instruments. Flints calcined and ground were formerly used to furnish the silica, but pure sand is now generally used instead. Oxide of lead enters largely into its composition, and to this are due its brilliancy, density, and comparative softness. The oxide should be prepared especially for the purpose to insure its purity. Oxide of zinc has been found to produce similar effects. As the glass is essentially and peculiarly of metallic composition, it might better be distinguished by this name than by those now applied to it. In the melting it is found necessary to use pots closed at the top with the opening made in a short neck on one side; this is to protect the melted matter from the smoke, which would discolor it, but the economy of direct exposure to the flame is thus lost. The English pots hold each about 18 cwt. The fusion must be rapid and at intense heat, and this must be reduced as soon as the metal is thoroughly melted and refined by the escape of the bubbles of gas, or the product acts upon the alumina and iron of the pot, and is thus so contaminated as

to be worthless. The method of shaping the articles by blowing them in a mould is applied to many of the vessels made of flint glass; and that the polish may not be affected it is necessary to keep the moulds nearly at a red heat as they are used. This glass is also shaped by the American process of pressing the soft metal in a die of the required form, into which it is introduced. For large articles considerable pressure is applied. The die is kept at a heat approaching redness, and at each operation must be furnished at once with the exact quantity of melted glass necessary to fill it, a feat which requires skill and practice. The process called cutting glass is in reality grinding and afterward polishing it. It is easily effected upon the soft flint glass by applying the surfaces to be cut to the face of revolving disks of iron or copper fed with emery, or, for coarse grinding, with sand and water. Stones are also used instead of the metallic disks. The marks of the rough grinding are removed by a smooth grindstone, and the polishing is then completed by wooden disks, to which pumice or rotten stone, and finally the preparation of tin and lead called putty powder, are applied. The fine polishing of chandelier drops is effected by a lead wheel supplied with fine rotten stone and water. Glass globes and lamp shades acquire their interior ground surface by the wearing action of sand placed within them, the globes being themselves introduced into the interior of a drum which is caused to rotate rapidly. Letters and designs are engraved on glass by means of small disks of copper set in rapid revolution, and fed with fine emery mixed with oil (see GEM ENGRAVING); or they may be etched.—No glass is of such importance in the arts as that of which the lenses of optical instruments are made. Both flint and crown glass are applied to this use, each of which has its defects; the former, from the great difference in the densities of its ingredients, is with much difficulty obtained of homogeneous structure, an essential requisite in all glass used for optical purposes; and the latter is difficult to procure of uniform composition and texture, from the high temperature required for its fusion and the consequent tendency to devitrify in cooling; or if this is obviated by increased proportion of alkali in the composition, the excess of this causes attraction of moisture from the air and a damp surface to the lens. So difficult was it to obtain even a moderate quantity of homogeneous glass, that until the production of the lenses of Guinand, a Swiss clockmaker, in the early part of the present century, the size of the largest objectives was limited to about  $8\frac{1}{4}$  inches. By methods of his own he made with his own hands the furnaces, crucibles, and mixtures he employed, and produced the glass, which he shaped and polished, giving without knowledge of mathematics the requisite proportion to the curves of its surface, and completed lenses of flint glass of great perfection of structure, 9 inches in diameter. The secret of his success in making the glass is believed to

have consisted in keeping the mixture agitated by stirring when at its greatest liquidity, and then suffering it to cool and anneal in the pot. From the most perfect portions of the comparatively homogeneous mass thus obtained, the lenses were cut out by a process similar to that of sawing blocks of stone. By one of the sons of Guinand the secret was imparted to M. Bontemps; and in 1828 lenses were made in France of 12 to 14 inches diameter. In 1848 Bontemps removed to England, to join with the Messrs. Chance and co.; and the result of their operations has been the production of disks of flint glass 29 inches in diameter, weighing 2 cwt., and of crown glass 20 inches. These are of pure color, and of such homogeneous structure that the light is transmitted without polarization. Prof. Faraday, one of a committee appointed by the astronomical society of London to experiment upon the means of producing optical lenses, while Guinand's secret method of making these 6 inches in diameter was exciting the admiration of the scientific world, discovered the heavy glass called by his name, the composition of which has already been given, and which has proved of importance in investigations connected with the polarization of light; but its liability to change unfits it for general optical uses. Lenses both of flint and of crown glass are used in the object glass of achromatic telescopes, serving by their combination to counteract the unequal tendency of each to disperse the rays of light. The new optical glass of M. Maës of France has been found an excellent substitute for the crown glass lens; its basis is oxide of zinc, to which borax or boric acid is added. The subject will be further treated in the article *LENSES*.—The colored glasses are produced either upon the colorless composition called strass for imitations of precious stones (see *GEMS, ARTIFICIAL*), or by introducing the various oxides used for coloring into the materials of flint or other kinds of glass. Pigments are also applied to the surface of glass, and sometimes by their greater fusibility are burnt or melted in. Flint glass designed for vessels ornamented with colors may be employed of the composition already given as that of Mr. A. Pellatt, and to 6 cwt. of it the following ingredients are added for producing the respective colors: soft white enamel, 24 lbs. arsenic, 6 lbs. antimony; hard white enamel, 200 lbs. putty, prepared from tin and lead; blue transparent glass, 2 lbs. oxide of cobalt; azure blue, about 6 lbs. oxide of copper; ruby red, 4 oz. oxide of gold; amethyst or purple, 20 lbs. oxide of manganese; common orange, 12 lbs. iron ore and 4 lbs. manganese; emerald green, 12 lbs. copper scales and 12 lbs. iron ore; gold topaz color, 8 lbs. oxide of uranium. The colors produced by the metallic oxides are found to vary with the degree of heat employed. All the colors of the spectrum may be obtained with oxide of iron; and these various results do not seem to depend upon the different degrees of oxidation, but are thought to result from variations in mole-

cular arrangement, induced perhaps by the action of light. Some of the methods of coloring the surface of glass are too ingenious and curious not to be noticed. The quantity of coloring matter required is often exceedingly small, and may advantageously be incorporated merely with the outer portion of the glass. This is effected in the blowing by dipping the lump of clear glass, when shaped upon the marver, into the pot of melted colored glass, and then blowing it to the shape required, and flashing out if desired to convert it into panes. The color may be afterward reduced in intensity by grinding, and colorless facets be produced by cutting through the outer portion to the clear glass beneath. "Casing" is a somewhat similar process. The article of flint glass when partially blown is inserted into a thin shell of colored glass, prepared at the same time for its reception, and the blowing is continued till the inner one fills the shell, with which it is afterward well incorporated by softening in the furnace and further blowing. Several partial casings of different colors may be thus applied. Painting is the external application of colors mixed with a flux of much easier fusion than the glass, and with some vehicle, as boiled oil or spirits of turpentine. The mixture is laid on with a brush as in ordinary painting, or by blocks as in printing cloths; and the glass being then exposed to heat, the flux melts and sinks into the body. None of the clear bright colors are perceived until the work is completed, and the artist consequently labors under great disadvantage in applying the materials that are to produce them. He is guided either by lines drawn on the back side, which show through, or by a cartoon or drawing on paper placed there. The flux, if the coloring oxides are such as not to be affected by oxides of lead and bismuth, is composed of 100 parts of pulverized quartz, 135 of oxide of lead, and 50 of oxide of bismuth; or, if otherwise, with the same quantity of quartz are mixed 75 parts of glass of borax, 12½ of saltpetre, and 12½ of pure carbonate of lime. In the early use of glass for windows, especially those of churches, brilliant colors were highly esteemed, and great success was attained in the methods of coloring. The art fell into disuse, and the processes were lost, though the receipts for them were still to be found in the ancient treatises. This was particularly the case with the bright red color, which was imparted by the ancients with the protoxide of copper. In later times it was found impracticable to succeed with this on account of the tendency of the copper to pass to a peroxide and produce a green tinge; of late the practice is again introduced with success by the Tyne company in England, at Choisy in France, and other places. The discovery of the preparation of gold and tin, called purple of Cassius, also afforded another means of producing a brilliant red, as noticed in *GEMS, ARTIFICIAL*. Notwithstanding the introduction of processes not formerly known, and a more

exact understanding of the effects of the various oxides, which probably cause the art to be now better understood than ever before, the colors are considered less brilliant than those of ancient times. From this description it appears that what is called glass painting, which is more properly a process of staining, differs from all other styles of the pictorial art, except the painting of porcelain. The colors are different, being wholly of mineral composition, and are not merely laid on the outside, but are fixed by being fused into the material, undergoing in the operation chemical changes that develop the brilliancy and transparency of which the compounds are susceptible. Thus the colors are removed from the influence of external causes of change, and are permanently retained upon the most fragile of materials.—Soon after the introduction of glass into windows its appropriateness as a medium when colored for ornamentation of churches and other public edifices was perceived, and its first use for this purpose is believed to have been at the time when the ancient basilicas were converted into Christian temples, which, it is said, were adorned with stained glass. The magnificent churches erected on the continent of Europe in the 9th century were also generally thus ornamented. The glass was in small pieces brilliantly colored throughout, and set in leaden lines which were the outlines of the designs. Pictorial illustrations are not known to have been introduced before the 11th century. At that period there was a glass picture in a church window of the monastery of Dijon, which represented the mystery of the holy eucharist. In the year 949 mention was made, according to Mrs. Merrifield, of "a portrait of King Constantine (VII.) admirably executed on stained glass." In the ancient glass pictures the figures were formed of pieces of stained glass, and the shadows were laid on with dark colors and fixed in the fire. Intense colors were exclusively employed, the ruby and blue always predominant. The ground was mosaic in circles, squares, and lozenges, of massive forms, and filled with foliated ornaments in the Roman style. Over this were medallions representing historical and biographical subjects from the lives of the saints. When figures came to be introduced they were generally grotesque and distorted; but the costumes were remarkably correct. The designs always harmonized with the style of architecture, stately and magnificent in the Norman structures, and light and elegant in those of the early English models in the 13th century. In these the brilliant positive colors were made more subsidiary, appearing in borders, geometric bands, and central points, while the ground was of a neutral gray, produced by lines crossing each other at right angles. The designs were also more correctly drawn, and shaded with greater delicacy. For the violet tint always before used for the faces of the figures was substituted a gray or brown upon colorless glass. The pieces of glass were of larger size, and a single figure often was made to occupy a

whole window, standing beneath an elaborate blue or red canopy. In the background among the architectural fragmentary designs still appeared the old Roman foliated ornaments, but intermixed with original studies from nature, a style of the art which was afterward carried to great perfection. Not only leaves, plants, and trees, but even landscapes and buildings in perspective, appeared in the latter half of the 15th century; the smaller objects being introduced among the elaborate geometrical figures, which were arranged somewhat like frames around the principal figures. The Scripture pieces were often explained by legends painted upon the phylacteries, and in the background were represented rich blue or red hangings of damask. Among the glass pictures of the 16th century are found the finest specimens of the art. The most eminent painters practised it, as Albert Dürer, Claude, Palissy, and others, and their works are still admired in the churches of that period, as the Cologne cathedral, York minster, and many others. But in the next century the art had entirely declined, and has since found few votaries, for the reason, as Labarte suggests in his "Illustrated Handbook," that its intention was perverted in the transformation of an art of purely monumental decoration into an art of expression. For this oil painting possessed greater resources, and glass painting necessarily fell into neglect. In some modern attempts it is remarked that the primary object of the glass in transmitting light appears to be overlooked and sacrificed in the opaque shadows introduced. In 1830 a gorgeous glass picture representing the tourney between Henry VIII. and Francis I., at Ardres, June 25, 1520, was exhibited in Oxford street, London. It was a window 18 feet by 24, consisting of 850 pieces of glass, fitted into metal astragals, which were so concealed in the shadows that the whole appeared as one sheet of glass. It contained more than 100 life-size figures, 40 of which were portraits, among which were the two queens, Anne Boleyn, and Cardinal Wolsey. The picture was unfortunately destroyed by fire on the night of June 31, 1832.—ENAMELLED GLASS. Two varieties of enamelled glass, one known as "etched enamelled glass with clear ornaments," and the other as "flocked enamelled glass," are now largely made in Newark, N. J., in the works of Messrs. Cooper and Belcher of New York, the only manufacturers in the United States of the articles in large sheets, and the contractors for the enamelled glass for the New York crystal palace, for which 60,000 feet was furnished. The increasing demand for these beautiful varieties has recently led them to more than double the capacity of their works. The vitreous enamel which gives the opacity to this kind of glass was first devised by John Davenport of Burslem, England, who patented the process in July, 1804. From that time till 1837 the ornamental etching was effected by a tedious and expensive method by hand. Mr. William Cooper, then of Edinburgh, now the

senior partner of the above named firm, in that year secured a patent for a new method of cutting ornamental devices by machinery, &c., on which is based the system now in use. The enamel substance is ground to an impalpable powder, and laid with a brush in a pasty state upon the glass. After the paste is dried, the ornament is etched out by machinery or by hand, and the glass is then softened in the intense heat of the reverberatory furnace till the enamel is vitrified and incorporated with it. From this it is removed to the annealing kiln, the capacity of which is 2,000 or 3,000 superficial feet of large sheets, which is the usual amount of a week's work. The flocked variety of enamelled glass is prepared by the same method as that of the clear etched glass just described, except that a fine, smooth, opaque surface, like satin, much softer and smoother than that of ground glass, is previously given to the whole surface before the enamel is applied. This variety has in great part supplanted the other, and is justly much admired for the softness of the light diffused through it, and for the delicacy and beauty of the elaborate and artistic designs with which it is ornamented. Sheets of it are prepared up to 60 inches in length.—Etching is also applied to the ornamenting of glass, a process which is effected by the property of hydrofluoric acid to eat into the material, as described in the article FLUORINE. The glass is first covered over with a varnish that resists the action of the acid, and when this coating is dry, the lines to be etched are marked through it by means of a point. The acid is then poured on, and is allowed to remain till it has produced the desired effect. The difficulties and danger attending the use of the acid restrict this process to the ornamenting of large polished plates, and to the labelling in indelible letters the bottles of chemists and apothecaries.—GLASS, SOLUBLE, also known by the name of soluble silica, is a preparation of silica and caustic potash, either in equal parts, or in the form of a double silicate of potash and soda, which is soluble in boiling water. Attention was first directed to it by the chemist Von Fuchs as a suitable composition for rendering combustible bodies fire proof; and in 1824 portions of the new theatre in Munich were coated with it. He also employed the composition in the style of fresco painting called stereochromy, as a means of fixing the colors permanently (see FRESCO PAINTING); and it was used not only upon plastered walls, but with perfect success by Echter directly upon the sandstone of the Strasbourg minster. Von Fuchs proposed to render wood fire-proof, and even linen also, by means of it; to protect surfaces from the action of the weather; to prepare with it artificial stone; and to use it as a cement for glass and porcelain. But it appears to have been most successfully applied by Prof. Kuhlmann at Lille, who, as described by Liebig, manufactures it in enormous quantities to prevent the decay of walls and edifices, even when built of

very inferior stone, and for the use of print works and tapestry factories in fixing colors upon cotton and paper. In England also its preparation was early undertaken by Mr. F. Ransome of Ipswich, where many tons of the material are produced every week at the works of the "Patent Silicious Stone Company." Its preparation as a protective coating or as a cement depends on the principle, that when a caustic alkali in combination with silica becomes carbonated by exposure to the atmosphere, the silica is deposited in the pores of the material to which it is applied, and adheres closely to it; or if the stone be calcareous, as marble for instance, a chemical union takes place between the lime and liberated silicic acid. Mr. Ransome, finding this preparation imperfect from the liability of the silica to be washed away by the rains before it could set, applied a second solution consisting of chloride of calcium, which has the effect of causing a silicate of lime of great tenacity and indestructible by atmospheric influences to be immediately produced. His process is as follows: The walls being cleaned, a solution of silicate of soda or potash (the specific gravity of which may be varied to suit the nature of the stone) is applied with a brush; and when dry, the coating is in like manner brushed over with the chloride of calcium solution. The lime immediately combines with the silica, filling the pores of the stone, while the soluble salt of chlorine and soda which is also produced is removed at once by an excess of water. The union of the silica with the stone is found to be as perfect as that of the original particles of the stone itself. The soluble silica is prepared by dissolving carbonate of soda or potash in water, and then rendering the alkali caustic by the use of quicklime. The lime being removed, quartz crushed to powder is dissolved in the liquid in an iron boiler with the aid of steam pressure.

GLASS PAPER, a preparation similar to that of emery paper, made by dusting pulverized glass obtained from the fragments of broken wine bottles upon paper, which is brushed over with thin glue. The glass is first assorted by sifting into lots of different fineness. Instead of paper, thin cotton cloth is sometimes used.

GLASS SNAKE, a North American reptile, improperly called a snake, of the genus *ophisaurus* (Daudin), belonging to the order *sauriphidia* of Gray, and to the chalcidian or cyclo-saurian family of saurians of Duméril and Bibron. The head is lizard-like, sub-oval, with rounded snout, covered above with numerous polygonal plates, large anteriorly, the frontal the largest; the tongue arrow-shaped, triangularly grooved in front, free in its anterior extremity, on which the papillæ are granular; the nostrils are near the snout, lateral, opening upward; the eyes are small, protected by 2 movable unequal lids; there are several rows of short conical teeth, about 86 in number, on the roof of the mouth, chiefly on the pterygoid bones; the intermaxillary teeth are conical, the

maxillary simple and nearly cylindrical, about 40 in all above and 86 below; the external ear is a small oval opening just behind the angle of the mouth. There is no distinct neck; the body is elongated and snake-like, covered with small, smooth, slightly imbricated scales, disposed in circles around the body, about 120 in number; there is no vestige of anterior or posterior limbs externally, and only their rudiments internally; there is a deep groove separating the sides of the body from the abdomen, most visible during respiration, and which doubtless affords the free movement of the ends of the ribs necessary for progression. The tail forms at least  $\frac{1}{4}$  of the total length, round, and tapering gradually to the tip, covered with about 140 rings of scales. Though the shape of this reptile is snake-like, the movable lids, external auditory openings, less movable vertebrae, less extensible tongue, rudimentary sternum, and above all the consolidation of the bones of the skull and jaws, sufficiently show its saurian affinities. The length varies from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  feet. The head above is mottled with black and green, with a yellowish tinge on the jaws; the body and tail above are marked with longitudinal and transverse lines of black, green, and yellow, each scale marked with these 3 colors; the under surface is yellowish, brightest on the abdomen; some slight varieties of color are described. It is found on the Atlantic coast from southern Virginia to Florida, and as far west as the Mississippi, Missouri, and Ohio rivers; it has been seen west of the Alleghanies as far north as Michigan. From the smallness of its gape it cannot destroy and swallow large prey, like the serpents; it cannot climb nor swim, but passes its life on the surface of dry places or in natural cavities in the ground, living principally on mollusks, insects, annelids, and other small animals, and perhaps also partly on vegetable food like the sweet potato. It can move with considerable speed, and is taken uninjured with difficulty on account of the ease with which the joints of the tail are separated; the name of glass snake was given on account of this extreme fragility. The breaking of the tail into small pieces in this and in some scincoid reptiles seems to be the result of a reflex action in the spinal cord, as an irritation of this nervous centre will cause a separation even after the tail is divided from the body. Dr. Burnett ("Proceedings of the Boston Society of Natural History," vol. iv. p. 228) ascertained that the caudal muscles in this reptile do not pass from one vertebra to another, but that a portion are inserted into the skin, while others terminate midway between one vertebra and the next, dovetailed as it were between the fibres sent from that vertebra, and attached to them only by the *myolemma*; so that there is no rupture of muscular fibres, but only a separation of one layer of muscles from the adjoining one, when the tail of the animal is broken; the detached portion is said to be reproduced in a year. The glass snake in its anatomical

peculiarities of structure resembles the chalcidian amphibæna and the scincoid blindworm (*anguis fragilis*), which see.

GLASSBRENNER, ADOLF, a Berlin humorist, born March 27, 1810. His principal work, *Berlin wie es ist und trinkt*, was published from 1832 to 1850. A new edition of his *Verbotene Lieder* appeared in Berlin in 1851, and of his *Neuer Reineke Fuchs* in 1854. His racy delineations of life, some of which have appeared under his *nom de plume* of Brennglas, have become very popular, especially in Berlin. Banished from that city in 1850 on account of his sympathies with the democratic party, he has since chiefly resided in Hamburg.

GLASSITES, a religious sect in Scotland, whose founder was John Glass (1695-1773), a minister of the Scottish established church, who was deposed in 1728 for avowing opinions adverse to all legal establishments of religion. Robert Sandeman advocated the same opinions about the middle of the century, from whom the sect is sometimes called Sandemanians. They hold peculiar views of justifying faith and ecclesiastical polity, maintaining a spiritual union of their members which is not represented by any visible church. They observe also certain practices which they suppose to have been prevalent among the early Christians, as love feasts, washing of each other's feet, plurality of elders, and mutual exhortations. In 1851 there were 12 Glassite congregations, with accommodations for about 2,000 persons.

GLASTONBURY, a market town and parish of Somerset, England, 25 m. S. W. from Bath; pop. in 1851, 3,125. The town occupies an eminence nearly surrounded by marshy flats, and derives its interest and importance almost wholly from its ruins, prominent among which are those of a famous Benedictine abbey, founded, it is said, by St. Augustin in 605, rebuilt in great splendor about a century later, and enriched by the liberality of successive princes until the time of Ethelred I. It suffered from the Danes, and before the conquest, when the Normans robbed it of both wealth and influence, had gained considerable importance and celebrity. Its half ruined walls were rebuilt by Stephen and Henry II., and its abbot was honored with a mitre and a seat among the barons in parliament. At one time it was annexed to the see of Wells, the incumbent of which was called bishop of Glastonbury. On the suppression of monasteries by Henry VIII. it enjoyed a revenue of £3,508 13s. 4 $\frac{1}{2}$ d. In 1539 Richard Whiting, the last abbot, for refusing to surrender the abbey to the king, was hanged in his robes on Torhill with two of his monks. The abbey ruins, consisting of portions of the church, the chapel of St. Joseph of Arimathea, and a building called the abbot's kitchen, are comprised in a quadrangle of 60 acres, which was once encompassed by a high wall. A reputation for sanctity clung to Glastonbury long after the reformation, and as late as 1751 we hear of 10,000 invalids flocking hither in a sin-



gle month to drink from a spring said to have wrought miraculous cures. A work on the efficacy of these waters, entitled "Wilt thou be made Whole?" was published at Bath in 1751.

GLATZ, a county, circle, and town in the Prussian province of Silesia. The county comprises the circles of Glatz and Habelschwert in the district of Breslau; pop. 144,000. It forms a broad and uneven valley, surrounded by mountains, which separate it from Bohemia and Austrian Silesia, and is watered by the Neisse and its affluents. The soil in the vales is fertile, and on the mountain sides is favorable for grazing. There are mineral springs and coal mines, and flourishing linen and cotton manufactories. The possession of the county was long in dispute between Poland and Bohemia, and it frequently changed masters till conquered with Silesia by Frederic the Great; it was finally ceded to Prussia by the peace of Hubertsburg (1763).—The town is situated on the left side of the Neisse, and is strongly fortified, being defended by an old citadel, a modern fortress, and other works; pop. 10,650. It has a Roman Catholic gymnasium and college, a hospital, infirmary, barracks, and several factories. It was fortified as early as the 11th century, and has sustained numerous sieges. It capitulated in 1622 to the imperial troops, and in 1742 to the Prussians.—A part of the Sudetic mountains is often designated by the name of Glatzer Gebirge.

GLAUBER, JOHANN RUDOLF, a German chemist, born in Karlstadt in 1604, died in Amsterdam in 1668. He was a physician and alchemist, boasted of possessing several wonderful secrets, and was called the Paracelsus of his age. He passed his life in his laboratory, successively at Salzburg, Frankfurt, Cologne, and Amsterdam, and first exhibited the production of artificial salts, and discovered the salt to which his name is given. He wrote voluminously both on chemistry and alchemy, and a collection of his works were translated into English by C. Packe (London, 1689).

GLAUBER'S SALT, sulphate of soda, found native and artificially produced. The artificial salt was named from its discoverer (see above), who obtained it in making muriatic acid. The natural salt is usually met with as an efflorescence, sometimes deposited around hot springs, as at Carlsbad and Cheltenham, or about saline ponds, as in the country between the head waters of the Arkansas and Santa Fé, on the route to the Rocky mountains. It also occurs in a cavern near a volcano on Hawaii, one of the Sandwich islands, where it is produced by the action of the volcanic heat and gases upon the sea water. It is found as an efflorescence on the limestone rocks below the Genesee falls, Rochester, N. Y. It crystallizes in forms derived from an oblique rhombic prism. The crystals effloresce in the air, and lose their water of crystallization. It is most soluble in water at the temperature of 98.2° F., when, according to the experiments of Löwel, 412.22 parts of the

hydrated salt are dissolved by 100 of water; at 77° only 98.48 parts are taken up, and at 68°, 58.85 parts. The salt has a taste cool at first, then saline and bitter. It is white, transparent to opaque, of vitreous lustre, of hardness from 1.5 to 2, and specific gravity 1.481. Its composition is represented by the formula  $\text{NaO}, \text{SO}_3 + 10\text{HO}$ , making its equivalent 161, and the percentage of water 55.76. It is artificially prepared by decomposing common salt by sulphuric acid (as in the preparation of hydrochloric acid, of which process it is the residue), with an excess of acid, which is taken up by the addition of carbonate of lime. It is very largely manufactured in England and France in order to prepare from it carbonate of soda and soda ash; to avoid the production of muriatic acid, a process has been introduced of making the salt by the reaction of common salt and sulphate of iron upon each other. It is also obtained as a residuum in the manufacture of bleaching salts, muriate of ammonia, &c., and from sea water, by exposing the water to intense cold, when this, the least soluble salt, separates by crystallizing.—Sulphate of soda is principally of value as a medium for obtaining the other salts of soda. Formerly it was much used in medicine as an aperient and diuretic; but sulphate of magnesia has taken its place, though it is still an ingredient in Seidlitz powders. By dissolving it in hydrochloric or dilute sulphuric acid, cold is produced, by which water may be frozen in summer; and wine coolers have been made designed for its use, in which, with 12 lbs. of the salt and 10 lbs. of acid, 10 to 12 lbs. of ice have been formed in the course of an hour. (See FREEZING MIXTURES.) The salt is an ingredient in some kinds of glass.

GLEE (Sax. *glia*, from *glig*, *gligg*, sport, music), a vocal composition in 8 or more parts, which is generally performed without instrumental accompaniment. Gleees have for nearly 8 centuries formed a favorite musical recreation in England, although the term itself was not in use previous to the latter part of the 17th century.

GLEIG, GEORGE, a Scottish bishop and writer, born in Boghall, Kincardineshire, May 12, 1758, died in Stirling in Feb. 1889. He was educated at the university of Aberdeen, took orders in the Episcopal church, became in his 21st year pastor of a congregation at Pittenween, in Fifeshire, and was raised to the bishopric of Brechin in 1808. He was through life devoted to literature, was active in obtaining the repeal of the penal laws against the Episcopalians of Scotland, and edited the later volumes of the 3d edition of the "Encyclopædia Britannica," and wrote almost without assistance the 2 supplementary volumes. He is also the author of occasional sermons, and of "Directions for the Study of Theology" (London, 1827).

GLEIG, GEORGE ROBERT, son of the preceding, a Scottish clergyman and author, born in Stirling, April 20, 1796. He abandoned his studies at Oxford to join as a volunteer a regiment

going to Spain in 1818, and served both in the Peninsula and in America. On retiring from the army he resumed his studies at Oxford, took his degree, was ordained, and was subsequently appointed chaplain to Chelsea hospital, and in 1846 chaplain general to the forces. His exertions to establish a system of education for the soldiers have since gained for him the inspector-generalship of military schools. The works of Mr. Gleig are for the most part histories or novels. Of the former, the "Family History of England" (1836; 2d ed. 1854) and the "Military History of Great Britain" (1845) are most esteemed; and of the latter, the "Subaltern" (1835), "Chelsea Pensioners" (1829), and "Country Curate" (1834). His eulogistic "Memoir of Warren Hastings" (1841) has been severely criticized. In 1858 he collected 2 vols. of his "Essays," chiefly from the "Edinburgh" and "Quarterly" reviews.

GLEIM, JOHANN WILHELM LUDWIG, a German poet, born in Ermsleben, Prussia, April 2, 1719, died in Halberstadt, Feb. 18, 1808. He published odes, fables, tales, and songs, which obtained for him the title of the German Anacreon. One of his best fables is *Die Grille und die Ameise*. He was an enthusiastic admirer of Frederic the Great, and his best productions celebrated his exploits. His *Siegeslied nach der Schlacht bei Rossbach* is the most famous of his battle songs. Gleim was very popular in Germany, and exercised for about 40 years a master influence on literature, less by his genius than by his generous patronage of young authors. He was a bachelor, but his home, kept by his accomplished niece Sophia Dorothea Gleim (whom he celebrated in his songs under the name of Gleminde), was a favorite resort of the most eminent German poets and scholars. An edition of his works, which appeared in 7 vols. in Halberstadt (1811-'18), was completed by an 8th vol. (Leipzig, 1842).

GLENCOE, one of the wildest and most gloomy of the Scottish glens, in the district of Lorn, Argyleshire, about 10 m. in length, and enclosed by lofty mountains. The lower part of the glen near Loch Leven is cultivated and wooded, but the upper part is exceedingly rugged and barren, the mountains rising almost perpendicularly in fantastic forms, seamed with deep furrows worn by the winter torrents. A small lake, from which issues the Cona, lies in the middle of the valley. The path through the glen is lined by immense masses of rock. Near its N.W. extremity is the scene of the "massacre of Glencoe." After the revolution of 1688 many of the Scottish clans continued in arms for King James against King William. In Aug. 1691, the government of William issued a proclamation offering an amnesty to such insurgents as should take the oath of allegiance on or before Dec. 31. All the chiefs submitted within the prescribed time except the aged Maclean or Macdonald of Glencoe, whose tribe, a few hundred in number, inhabited this secluded valley. He went, Dec. 31, to Fort William and offered to take the oath; but the

colonel in command, not being a magistrate, could not administer the oath, and referred the chief to the sheriff at Inverary. Macdonald made his way to that place as speedily as possible over rugged mountains covered with snow, and took the oath of allegiance on Jan. 6, 1692. Three great Scottish nobles, the earls of Breadalbane and Argyle, and the master of Stair, who were then in London, determined to avail themselves of this unintentional delay to effect the destruction of the tribe of Macdonald, to whom Argyle and Breadalbane were hereditary enemies. The master of Stair was secretary of state for Scotland, and by representing to William that Glencoe had not submitted, and that the dwellers in the valley, whom he described as a band of robbers, were the only remaining obstacle to the complete pacification of the highlands, he obtained from the king an order for their extermination. It was executed with horrible treachery and cruelty. On Feb. 1 a body of soldiers, 120 in number, commanded by Campbell of Glenlyon, were sent to occupy Glencoe. They came professing peace and friendship, were received with the kindest hospitality, and for a fortnight lived at free quarters in the utmost familiarity with the people. On the evening of Feb. 12 the officers supped at Macdonald's house, and played cards with himself and his family. That same night, one of these officers, Lieut. Lindsay, with a party of soldiers, returned to the old chief's house, knocked, and was admitted. Macdonald rose from his bed to receive them, and was calling to his servants to bring refreshments for his visitors when he was shot through the head. His wife received such barbarous usage that she died the next day. Two of his attendants were also murdered. The commanding officer, Glenlyon, lodged in the house of a sub-chief, Inverriggen. At 5 in the morning the highlander and 9 of his family, among them a boy of 12 years old, were dragged from their beds and murdered in cold blood. At another house 8 persons sitting at breakfast were shot dead. In all, 40 persons were killed, among them several women. It was the intention of the butchers to slaughter the whole tribe, but owing to the inclemency of the night a detachment of soldiers sent to guard the outlets from the valley did not arrive in season, and the greater part of the people, aroused by the report of the fire-arms, fled naked to the mountains, where many of the women and children perished with cold and hunger. No punishment was inflicted on the authors of this crime. A graphic account of the massacre of Glencoe is given by Macaulay in his "History of England," vol. iv., and Campbell has made it the subject of a poem, "The Pilgrim of Glencoe." A writer in "Blackwood's Magazine," July, 1859, accuses Macaulay of partiality in his account of Glencoe, and charges the responsibility of the massacre on William III., acquitting him, however, of any intention of sanctioning treachery and breach of hospitality.

GLENDOWER, or GLENDWR, OWEN, a Welsh

chieftain, born in Merionethshire about 1849, died Sept. 20, 1415. His father was Gryffydd Vychan, and his mother, Elena, was granddaughter of Llewellyn, the last Welsh prince of Wales. He studied law at the inns of court in London, and became a barrister, but soon quitted the profession for that of arms. He was made squire of the body to Richard II., to whom he adhered to the last of his disastrous reign. In 1387 he was knighted, and at an early age married Margaret, daughter of Sir David Hanmer. After the deposition of Richard II., he retired to his lordship of Glendwrddwy in Wales. His retirement was wrongfully construed into disloyalty to the new king Henry IV., and his estates were declared forfeited, and seized by Lord Grey de Ruthyn, an Anglo-Norman nobleman whose domains adjoined those of Glendower. Thus driven into rebellion, Glendower proclaimed himself prince of Wales, and called his countrymen to arms. The Welsh bards, who hated the English, by whom they were persecuted and treated as vagabonds, espoused with ardor the pretensions of Glendower, to whom they attributed supernatural and necromantic powers, and whose fame they spread so rapidly that he was soon at the head of a considerable force of enthusiastic partisans. In the summer of 1400 he invaded and seized upon the estates of Lord Grey. That nobleman in reprisal, with the help of Lord Talbot, who had been sent to his assistance by the king, surprised and captured the residence of Glendower, who narrowly escaped being made prisoner. Rallying his followers, he pillaged and burned the town of Ruthyn, and made such progress that the king in person took the field against him. A long contest ensued, in the course of which Glendower, in 1402, made prisoner his old enemy, Lord Grey, who was compelled to pay a ransom of 10,000 marks, and to marry Jane, the 4th daughter of the Welsh chieftain. He next destroyed the cathedral of Bangor, and the cathedral and palace of St. Asaph, defeated Sir Edmund Mortimer at Pilleth Hill, near Knighton, in Radnorshire, with a loss of 1,000 men, took Sir Edmund prisoner, and treated him with such kindness that he became Glendower's partisan, and arranged for him an alliance with the Percys of Northumberland. The confederates agreed to divide the kingdom among themselves. The earl of Northumberland was to have all north of the Trent; Glendower all west of the Severn; and Mortimer, in the name of his nephew Edward Mortimer, the rightful heir to the crown, was to have the rest. Glendower, who was now at the height of his power, called together the estates of Wales, and was formally crowned prince at Machyulleth. In 1403 the confederates gave battle to Henry near Shrewsbury, and were defeated, Percy being killed in the action. In 1404 Glendower entered into an alliance offensive and defensive with Charles VI. of France. He gained some victories, but in March, 1405, he was defeated with the loss of 800 men at

Grosmont castle, and a second time in the same month at Mynydd pwl Melyn, with a loss of 1,500. For a time he wandered a fugitive through Wales, concealing himself in woods and caves. The French king, however, sent him a reinforcement of 12,000 men, to whom Glendower joined 11,000 Welsh, and marching into England, penetrated as far as Worcester. Here several indecisive engagements took place, and at length the French and Welsh allies retreated into Wales, and shortly afterward the French returned to their own country. For some years Glendower, protected by his mountains and forests, waged a partisan and predatory war with varying success, and at the time of his death was negotiating with Sir Gilbert Talbot, who had been sent by Henry V. to offer Glendower and his followers a free pardon on condition of returning to their allegiance. Glendower had 5 daughters and several sons, most or all of whom fell in battle in 1400.

GLENTWORTH, GEORGE, an American physician and surgeon, born in Philadelphia, July 22, 1785, died there, Nov. 4, 1792. After visiting various parts of Europe in 1755, he was graduated at the university of Edinburgh in 1758. He became a junior surgeon in the British army during the last French war in America. In 1777 he relinquished an extensive practice, and became first a regimental surgeon, and afterward senior surgeon, in the American army. In this capacity he extracted the ball received by Lafayette at the battle of Brandywine. Subsequently he was appointed director-general of hospitals for the middle division.

GLIDDON, GEORGE ROBERT, an English Egyptologist, born in Devonshire in 1809, died in Panama, Nov. 16, 1857. He went at an early age to Alexandria, where his father was a merchant, and also U. S. consul. He resided in Egypt 28 years, and was during part of the time U. S. vice-consul at Cairo. After leaving Egypt he came to the United States, and lectured at Boston, New York, and Philadelphia, on Egyptian antiquities. At the time of his death he was agent for the Honduras inter-oceanic railway company. He was the author of the following works: "Appeal to the Antiquaries of Europe on the Destruction of the Monuments of Egypt" (1841); "Discourses on Egyptian Archaeology" (8vo., London, 1841); "Oria Egyptiaca" (1849); "Ancient Egypt" (1 vol. 4to., London and Philadelphia, 1850; new ed., 8vo., London, 1858); "Types of Mankind," written in conjunction with Dr. J. O. Nott and others (Philadelphia, 1854); "Indigenous Races of the Earth," also partly written by Dr. Nott and others (8vo., Philadelphia, 1857).

GLINKA, the name of a Russian family, to which the following literary men, all natives of the government of Smolensk, belong: I. GRIGORI, born in 1774, died in Moscow in 1818, served as page at the imperial court and as an officer in the army, held various civil offices, officiated as teacher of the Russian language at the university of Dorpat, and accompanied the

grand dukes Nicholas and Michael on their travels in Russia and abroad. He wrote "The Ancient Religion of the Slavi" (1804) and various minor works, and translated a number of French and German books, chiefly on historical subjects. II. **СМЕНДИН**, born in 1774, died in Moscow in 1847, served in the army, which he left in 1799 with the rank of major, and was engaged as teacher in the Ukraine and at Moscow. Among his works are: "Natalia," a drama (1806); a translation of Young's "Night Thoughts" (1806); "Prince Michael of Tchernigov," a tragedy (1807); "Fair Olga," an opera (1808); "History of Russia for Young People" (10 vols., 1817 *et seq.*). He also edited the "Russian Messenger" from 1808 to 1821, and an autobiography of Suwaroff (1819). III. **ЕМОЗ**, born in 1788, served in the Austrian campaign of 1805 against Napoleon, and during the invasion of Russia in 1812, became colonel, was accused of being a member of secret societies and sent to Petrozavodsk in the government of Olonetz, and became after his return to the capital president of the "Society of Friends of Russian Literature." He is highly esteemed both as a poet and as a military historian, his chief productions being "Letters on the Campaigns of 1805-'6 and of 1812-'15" (8 vols., 1815 *et seq.*), historical novels, and poetical translations from the Bible. IV. **МИХАИЛ**, born in 1804, died in Berlin in 1857, was the author of various national Russian operas, and became the director of the imperial opera as well as of the choir of the imperial chapel at St. Petersburg.

**GLOBE, ARTIFICIAL**, a hollow sphere of sheet metal, plaster, pasteboard, paper, or other material, upon the surface of which is delineated a map of the earth or heavens, with the various circles to which points are referred to determine their positions. Globes are thus of two sorts, severally called terrestrial and celestial. They serve as models to impart correct ideas of the form and movements of the earth and of the heavenly bodies, of their position in relation to each other at different times, also of the relative positions of places upon the earth, and of the principle of designating these by lines of latitude and longitude. Globes are also applied to the mechanical solution of various astronomical problems, as the difference of time in different places, dependent on the position of the sun in relation to those places, the times of the rising and setting of the sun at any place, and many other similar questions, which may be approximately determined without recourse to mathematical calculations. It is however chiefly for the sake of the clear instruction in general geography, which many persons fail to derive from maps, that globes are especially valuable. It is unknown when they were first constructed; but the first terrestrial globe is supposed to have been made by Anaximander of Miletus, a pupil of Thales, who flourished about 600 B. C. Ptolemy made use of one provided with the universal meridian, such as is applied to those now in use. The ancients are also said

to have had celestial globes. Martin Behaim, the celebrated navigator, constructed a terrestrial globe at Nuremberg toward the close of the 15th century. Tycho Brahe had one of copper nearly 5 feet in diameter. Another was made in Venice in 1688 for Louis XIV., 12 feet in diameter. Another, 11 feet in diameter, constructed by Brousch of Limburg, attracted the attention of Peter the Great, who caused it to be purchased and removed to St. Petersburg. It was large enough to accommodate 12 persons sitting around a table within it. Its inner surface was celestial, the stars being represented by gilded nails; and the outer surface was terrestrial. The imperial library of Paris has 2 globes of over 14 feet diameter. A magnificent copper globe made for Louis XVI. is in the Mazarin library; and another of the same material and of admirable workmanship, designed by Poirson, for the instruction of the king of Rome, and bought by Louis XVIII. for 86,000 francs, is in the museum of the Louvre. In 1851 a globe of mammoth dimensions and novel construction was built in Leicester square, London, by Mr. Wyld. It was 56 feet in diameter, and the delineations were upon the inside only. These were modelled in slabs of plaster of Paris, which were set like a ceiling on the ribs of zinc which formed the framework of the structure. The slabs were cast in clay moulds, which were prepared with care from the most correct maps on a scale of 10 miles to the inch. About 6,000 slabs were required to cover the whole surface, their dimensions varying from 2 feet square as the width diminished toward the poles. The topographical features were represented in relief, and the surface finally painted in colors. A stairway wound around from the base by which the circular platforms one above another were reached that brought the spectators near to the inner surface of the great shell. —The globes used by geographers in the middle of the last century were very similar in their details to those now in use. Much attention was directed to their manufacture, and a treatise on their construction and use was published in 1769 by Mr. George Adams, mathematical instrument maker to his Britannic majesty. The first requisite is a ball to receive precisely the printed map; this is therefore first accurately measured, and due allowance is made for the shrinking each segment will experience after being wet. The diameter being determined, a silver-steel semicircle  $1\frac{1}{2}$  inches wide and  $\frac{3}{4}$  inch thick is next made, of precisely half this diameter less that of the wires intended for the poles. A globe of wood is now made  $\frac{2}{3}$  of an inch less in diameter than the steel circle. Into 2 opposite points of this so called mould bits of No. 7 wire are inserted for poles. Dry paper is laid all over it to prevent the pasted paper to be next laid from adhering. This is of coarse heavy quality, and some 8 or 10 layers saturated with paste are applied in succession as evenly as possible, covering the whole surface. As this coating becomes dry, it shrinks and fits tightly

over the mould. It is then hung by the poles in the front edge of a bench fitted to receive it, and by applying a knife on the line of the equator while the ball is made to revolve, the shell is cut through, so that it may be taken off the mould in two hemispheres. This being done, a turned stick of right length with a short wire in each end for poles is introduced, one end in each hemisphere, and the two shells being brought together are secured by glueing their edges. The ball, called in its present state the foundation, is placed in the steel semicircle, and coated with a composition of glue and whiting. Being made to revolve, the excess of the composition is removed by the circle, and the ball is thus turned smooth and true, after which it is carefully dried. The next process is to lay out the lines of latitude and longitude, which is done by a beam compass, commencing with the colures and ecliptic. The first meridian is usually made to pass through the intersections of the equator and ecliptic, the points of the vernal and autumnal equinoxes; and from the former of these points the reckoning of the degrees on the equator and ecliptic begins. The maps are now to be cut on the engraved meridians of each  $15^\circ$ , thus making 24 segments; and these are pasted in succession with white paste upon the foundation, the lines drawn upon it serving as guides. The fitting requires great care, that the edges may be made to exactly coincide, and some stretching of the equatorial portions is sometimes requisite. When dry the paper covering is colored, and then sized with gelatine and immediately varnished. The final process before mounting is to dry again at  $200^\circ\text{F}$ . Holtzapffell says: "A globe is usually covered with 26 pieces of paper, namely, 2 pole papers or circles, including  $30^\circ$  around each pole, and 24 gores meeting at the equator. Sometimes the gores extend from the pole to the equator; every gore has then a narrow curved central notch extending  $30^\circ$  from the equator." The globe is hung for support by its poles in a brass circle, which goes round it and is called the universal meridian, inasmuch as any point upon the surface of the globe revolving in this may be brought under it. It is divided into degrees, which on one side are reckoned from either pole toward the equator for the purpose of giving the elevation of the poles, and on the other from the equator toward either pole, to be used for finding the latitude of places. A frame or stand is prepared to receive the globe with its brass circle, the top presenting a broad horizontal circle with two vertical slots placed opposite each other for receiving the brass meridian; which when adjusted is free to slide around in its own plane, so that the poles may be upright, horizontal, or at any angle to the horizontal circle. Around this circle, which represents the rational horizon or imaginary plane passing through the centre of the earth, are drawn several concentric circles; the innermost represents the horizon, and the slots for the brass circle are on the N. and S. points; the

degrees on the northern 2 quadrants are reckoned from E. and W. toward the N., and those on the southern toward the S. Outside of this is the circle representing the calendar, with the names of the months and divisions corresponding to the days. The next circle contains the signs and degrees of the ecliptic, so arranged that against each day of the year is found the point of the ecliptic in which the sun is situated. In the globes recently constructed by Messrs. Moore and Nims of Troy, N. Y., the horizontal circle is made to revolve. It is attached to arms which extend below the brass meridian, and unite, supporting the adjusting clamp, which supports the brass meridian. A taper pin extends down 3 inches from the lowest part of the arms and fits into a socket in the iron base, thus securing by the revolutions of the meridian and horizon in their own planes the effect of a universal joint, so that any part of the globe can be brought under observation without changing the position of the base. Upon the N. pole of the globe is attached a small circle of brass, called the hour circle, the pole passing through its centre, and holding it so that the two move round together, but yet admitting the hour circle to be moved round by the hand upon the axis. The circle is divided into 24 equal parts, corresponding to the hours of the day, and either one of these can be placed upon any meridian by turning the circle. The quadrant of altitude is a brass slip equal in length to  $\frac{1}{4}$  the circumference, and divided into  $90^\circ$ . It is fastened to the brass meridian, and is used for measuring degrees in any direction on the globe. A mariner's compass is sometimes attached to the frame of the globe for the purpose of placing the meridian in a N. and S. line. The various circles connected with the terrestrial globe are equally appropriate to the celestial; and as the latter are ordinarily constructed, the observer is supposed to be looking down upon the heavens presenting a convex surface, upon which the stars and constellations are mapped in their proper relative positions. To render the nature of the imaginary circles to which the points upon both globes are referred more clear for the student, the armillary sphere was contrived, which consists of the several circles in the form of graduated brass rings placed in their appropriate positions, and containing in the centre a small globe representing the earth. These circles are the horizon, meridian, equator, ecliptic, equinoctial colure, and the solstitial colure. The sphere formed by them is supported in a frame in the same manner as the globes.—To render the principles taught by globes more familiar and intelligible to students, these instruments were constructed many years since in England with blank surfaces, or at least with nothing more than the meridians and parallels of latitude drawn upon them. They were covered with a substance on which drawings could be made with a slate pencil and easily effaced. White globes were also in use

in the United States 30 years ago, adapted for similar practice with the lead pencil. The so called blank slate globes recently introduced are of the same character. The globes of Messrs. Blunt of New York have on them isothermal lines and deep sea soundings.

GLOGAU, a circle in the Prussian district of Liegnitz, formed of part of the former principality of Glogau in Lower Silesia; pop. 72,800.

—GLOGAU, or GROSS-GLOGAU, the capital of the district, is situated on the left bank of the Oder, 44½ m. by rail from Berlin, and 175 m. from Breslau; pop. 16,200. It is strongly fortified, and contains an old castle, 4 churches, a Protestant and a Roman Catholic gymnasium, extensive barracks, several hospitals, and various manufacturing factories. It is connected by a bridge with an island in the Oder, on which stand the cathedral and a strong fortress.

GLOMMEN, a river of Norway, rising in the mountains of the E. part of the province of Drontheim, in lat. 63° N., and flowing for the most part nearly due S., through several lakes, into the Skager Rack. Its length is about 360 m. The entire valley through which it flows is remarkable for picturesque scenery, cataracts, and forests of pine, producing the finest timber in Europe. From the town of Røraas to the Oieren lake, the river is a mountain torrent. The head of navigation is at Sarpsborg, about 10 m. above Frederikstad, which stands at the mouth of the river. About half a mile above Sarpsborg is the famous cataract of the Glommen, known as Sarpfoss. The river, a short distance above, is divided into two branches, which flow in parallel directions to the sea. The E. branch, having forced its way through a rugged defile, reaches the brink of a precipice, where, although divided at the summit by a projecting cliff, it falls an unbroken and perpendicular cascade, about 75 feet. The abyss is strown with large masses of granite, which break the volume of water into vast sheets of foam. On the brink of the fall, the stream is about 120 feet wide, and from 26 to 30 feet deep, according to the season. The rapids, for a short distance inward, are remarkably fine, but before reaching Sarpsborg the river has again become a smooth-flowing stream, and preserves this character for the remainder of its course.

GLONOINE, a compound of oxide of glycol with nitrous acid, obtained in the form of a heavy yellow oil by the action of nitro-sulphuric acid upon glycerine. The glycerine in sirup is slowly added to a mixture of 2 parts by measure of sulphuric acid, sp. gr. 1.838, and 1 part of nitric acid, sp. gr. 1.48, surrounded by a freezing mixture. The ingredients should be kept in constant agitation. By adding water the glonoine is precipitated, and may then be separated, dissolved in alcohol, and precipitated from this in a pure state. It is a sweet, aromatic, and pungent substance, remarkable for its action upon the animal system, the smallest quantity placed upon the tongue producing violent headache, and exceedingly minute doses

when swallowed being followed by giddiness, a sense of fullness and pressure in the frontal region, and headache. When a single drop is mixed with 5,000 globules of milk sugar, the peculiar effects of the substance are experienced by some persons on taking only 5 of these globules. Most persons are thus affected by 20 of the globules or  $\frac{1}{10}$  of a grain. A cat has been destroyed by a dose of 4 drops, and another by 3 drops. The largest dose taken by a man has been  $\frac{1}{10}$  of a drop. Coffee is found to be an antidote to the effects of a large dose. The name given to the compound is made from the symbols of its ingredients, with the termination *ine*.

GLOUCESTER. I. A S. W. co. of N. Jersey, separated by the Delaware river from Penn. on the N. W., drained by Big Timber, Oldman's, Raccoon, and Mantua creeks; area, 280 sq. m.; pop. in 1855, 16,261. The surface is generally level, and much of it covered with forests. The soil along the banks of the Delaware and for about 7 m. inland consists of a clayey loam, productive, and well cultivated. Marl is found here, and iron ore is obtained near Woodbury. The S. E. part of the county is sandy and mostly unimproved. The productions in 1850 were 880,221 bushels of Indian corn, 59,037 of wheat, 11,886 of oats, 253,964 of potatoes, 254,870 of sweet potatoes (the greatest quantity produced in any county of the state), 14,152 tons of hay, and 257,022 lbs. of butter. There were 19 corn and flour mills, 14 saw mills, 1 woollen and 4 glass factories, 1 newspaper office, 26 churches, and 3,656 pupils attending public schools. Organized in 1677, and named from Gloucestershire, England. Capital, Woodbury. II. A S. E. co. of Va., bordering on Chesapeake bay, bounded N. by the Piankatank, and S. W. by York river; area, about 280 sq. m.; pop. in 1850, 10,527, of whom 5,557 were slaves. The surface is level, and the soil light and productive. Among the most important exports are oysters and fish, the taking of which employs large numbers of the inhabitants, and wood, which is sent to New York and Philadelphia. The agricultural products in 1850 were 836,068 bushels of Indian corn, 65,551 of wheat, 11,934 lbs. of wool, 575 of tobacco, and 62 bales of cotton. There were 16 corn and flour mills, 3 saw mills, 2 tanneries, 14 churches, and 258 pupils attending public schools. Value of real estate in 1850, \$1,297,432; in 1856, \$1,879,792, showing an increase of 45 per cent. The county was formed in 1642. Capital, Gloucester Court House.

GLOUCESTER, a N. E. co. of New Brunswick, bounded N. by the bay of Chaleur, W. by the gulf of St. Lawrence, and drained by Nipisiquit, Cawaquette, Pohamoeche, and Tracadie rivers; area, 1,250 sq. m.; pop. in 1851, 11,704. The surface inland is diversified by hills, between which lie fertile valleys. The climate is favorable for agriculture, while the great extent of coast, off which are several islands, and the number of good harbors, afford opportunities for fishing and lumbering. Ship-building is actively carried on. Capital, Bathurst.

GLOUCESTER, a town and seaport of Essex co., Mass., on the S. side of the peninsula of Cape Ann, 28 m. N. N. E. of Boston; pop. in 1850, 7,805; in 1855, 8,935; in 1859, estimated at 12,000. Gloucester formerly comprised the whole of Cape Ann, and was 8 m. long by 5 broad; but in 1840 the E. portion of the peninsula was formed into the town of Rockport. The Indian name of Gloucester was Wingaersheek. It was occupied as a fishing station in 1624, and was the first place settled by the English on the N. side of Massachusetts bay. In 1642 it was incorporated under the name of Gloucester, some of the principal inhabitants having come from Gloucester, England. In 1692, a year of great spiritual commotion in New England, the people of the town fancied themselves infested by armed Frenchmen and Indians, who were frequently seen and fired at, and who in return fired at the inhabitants, though without effect. The alarm continued for 8 weeks, and several hundred men were kept under arms. It was finally concluded that these "unaccountable troublers" were spectral visitants, and the clergyman of the town, the Rev. John Emerson, expressed it as his opinion that "all rational persons will be satisfied that Gloucester was not alarmed for a fortnight together by Frenchmen and Indians, but that the devil and his agents were the cause of all that befell the town." A more tangible enemy, the British sloop-of-war Falcon, Capt. Linzee, assailed the town, Aug. 8, 1775, bombarded it for several hours, and attempted to cut out some vessels in the harbor. The people made a gallant resistance, and killed, wounded, or captured nearly half the Falcon's crew, and all her boats except a small skiff. In the second war with Great Britain, Sept. 8, 1814, Gloucester was attacked by the British frigate *Tenedos*, which, however, did no serious damage, but lost a barge and 18 men in the contest. In both of these wars the town sent out swarms of privateers, and contributed largely to the manning of the U. S. navy.—There are 4 distinct villages in the town of Gloucester: Sandy Bay, at the E. extremity of the cape, where a pier and breakwater have been constructed for the protection of shipping; Annisquam, or Squam, on the N. side of the cape, which has a safe harbor much resorted to by fishing vessels, and a beach 2 or 3 m. long, of white sand, of which large quantities are carried away and sold; West Parish, in which there is an ancient church, one of the oldest in New England, situated on a high hill, with a fine view of the sea; and lastly, Gloucester village, or "The Harbor," which has one of the best ports on the coast, capacious, safe, easy of access, and with sufficient depth of water to admit the largest vessels. The village is handsomely and compactly built, and is very beautifully situated, with extensive and picturesque sea views. Of late years it has become a fashionable summer resort for bathing and sea air, and several fine hotels have recently been erected. It is the first fishing town in the United States, and

the third in Massachusetts in foreign commerce. It has considerable trade with Surinam. In 1856 there were 203 arrivals from foreign ports; 18 ships and 320 schooners were owned in the place, tonnage 30,744. The fishing business employs a capital of about \$1,500,000. In 1859 the number of fishing vessels was 357 and the number of fishermen 8,890. In 1855, 43,201 barrels of mackerel were taken, worth \$388,809; the value of codfish taken was \$293,850. In 1857, 64,599 barrels of mackerel were taken, and in 1858, 54,562. In 1855 the value of the manufactures and other products of Gloucester was as follows: bar iron, anchors, cables, &c., \$50,800; sails, \$95,250; oil, \$18,035; soap and candles, \$11,480; boots and shoes, \$32,175; building stone (granite), \$75,000; bread, \$69,500; ice, \$15,000; coffee burnt and ground, \$30,000. Gloucester contains 11 churches; and 3 newspapers are published weekly, one of them also semi-weekly. There are 2 banks and a savings institution, 2 marine insurance companies, and a gas-light company. A branch of the eastern railroad connects the town with Boston.

GLOUCESTER, a city and municipal and parliamentary borough of England, capital of Gloucestershire, on the left bank of the Severn, 114 m. by rail N. W. from London; pop. in 1851, 17,572. The chief public edifices are the cathedral, which grew up from a monastery between the 7th and 15th centuries, several handsome parish churches, a college, blue coat and free grammar schools, the county hall, hospitals, &c. The college school was founded in 1536; the free grammar school, founded in 1539, has an income of £30 a year, and 2 exhibitions of £50 a year each to Pembroke college, Oxford; and the blue coat school, founded in 1666, and superintended by the corporation, supports, educates, and apprentices 20 poor boys. The handsomest portion of the town is at the S. end, around a spring of saline chalybeate water discovered in 1814. The staple manufactures are pins, hardware, bells, gloves, saddles, canvas, ropes, and soap. A bell foundry was established prior to 1500. Since the completion in 1827 of the Berkeley ship canal, by which vessels of 500 tons burden can come up to the city, the commercial importance of Gloucester has greatly increased. The city is probably of British origin. It became a Roman station under the name of Colonia Glevum, and under Claudius, received the name of Claudia Castra. The Saxons called it Glean-ceaster, and it flourished during the heptarchy. In the 17th century it was strongly fortified, and took a conspicuous part against the royalists. It is governed by a mayor, 6 aldermen, and 18 councillors, and returns 2 members to parliament.

GLOUCESTERSHIRE, an inland co. of England, bounded N. by Worcestershire and Warwickshire, E. by Oxfordshire, S. E. by Berkshire, S. by Wiltshire and Somersetshire, and W. by Monmouthshire and Herefordshire; area, about 1,258 sq. m.; pop. in 1851, 453,805. It is traversed from N. E. to S. W. by the Cotswold

hills, which separate the basin of the Severn from that of the Thames. The district between these hills and the Severn comprises the vales of Evesham, Gloucester, and Berkeley, of surpassing beauty and richness. Beyond the Severn the greater part of the shire is under forest, more than 20,000 acres of which still belong to the crown; it is called the forest of Dean, and was once deemed the principal support of the English navy. The chief rivers are the Severn, Wye, Lower and Upper Avon, Frome, Thames, Calne, Windrush, and Ledden. This county has been long famous for its butter and cheese. Large numbers of sheep are reared on the Cotswold hills and in the forest region, the latter being also noted for the excellence of its cider and perry. Coal exists in great abundance; lead, sulphuret of iron, oxide of zinc, limestone, coral, quartz crystals, celebrated as Bristol diamonds, and gypsum, are also found. The staple manufactures are woollens, cottons, silks, hosiery, hats, tick, hardware, glass, paper, and carpets. The shire is divided into 28 hundreds and 351 parishes. Capitals, Gloucester and Bristol. It returns 15 members to parliament—4 for the county, 2 each for the cities of Bristol and Gloucester and the boroughs of Cirencester, Stroud, and Tewkesbury, and 1 for Cheltenham.

GLOVE, a covering for the hand (sometimes extending up the arm), with a separate sheath for each finger, worn either as a protection to the hand, or as an ornamental article of dress. The use of gloves is traced back to very early periods. They are spoken of by Homer as worn by Laertes to protect his hands while working in the garden. Xenophon speaks of Cyrus going without his gloves. The custom of giving a glove as a pledge in concluding a contract is very ancient, and from this is supposed to have been derived the later custom of throwing down a glove as a challenge, which the opposite party accepted by picking up the glove and throwing down his own. This is traced back in England as far as the year 1245. In recent times a ceremony of the same import is performed by the parties interchanging their cards. In the middle ages gloves were an object of special regard. They were made in the most costly manner, ornamented with precious stones, and worn by kings and the church dignitaries upon ceremonial occasions. It was her glove which the lady of chivalric times gave her faithful knight to wear in his helmet as a pledge of her favor; and the same token was presented by the highest officials in conferring dignities and bestowing lands. Down to the present time curious ceremonies have been associated with gloves, as the custom in some parts of Europe of taking them off when entering the stable of a prince or great man; or else forfeiting them or their value to the servants. In hunting, the same ceremony must be performed under the same penalty at the death of the stag. Glove money is a term of ancient use, meaning money given to servants to buy gloves. Presenting a

pair of gloves for any favor rendered is a very old custom, which in the United States is retained among the Episcopalians and other religious sects, who at funerals make it a point to furnish the attending clergy and bearers with pairs of black gloves and scarfs. This had proceeded to such an extravagant extent in Massachusetts that the legislature forbade the practice under the penalty of £20.—Gloves are made of a variety of materials, according to the use they are designed to serve. In cold regions they are of the warmest wool, or of the skins of animals with the fur upon the outside. Thick buckskin, often lined with soft woollen, is also used, but in more moderate climates lighter qualities of leather, to the softest kid, are employed, and also worsted, cotton, and silk. The preparations of caoutchouc are applied to the same purpose. The art of glove making is carried to its highest perfection in the manufacture of kid gloves by the French. The English, who make excellent gloves of heavier varieties of leather, themselves admit their inability to attain the skill of the French in this department, and largely import the best Parisian gloves. The difference is exhibited even in the cutting of the skins to the best advantage; a process performed with a pair of scissors after stretching and rubbing the skin upon a marble slab with a blunt knife. A skin is first cut longitudinally through the middle, by which it is divided into two equal and similar parts, and the single strip for the palm and back is next cut off from one end of the half skin. The pieces for the thumb, the gussets for the fingers, and other small pieces to be inserted, must all be worked out either from the same skin or from others precisely similar. In this work, it is said, "a Frenchman will generally manage to get one or two pairs of gloves more than an Englishman can from the same skins, and these not inferior, or scanty, but as well and handsomely shaped as the rest. This clever and adroit manipulation of the leather is an object of great importance in France, where not less than 875,000 dozens of skins of all kinds are cut up into gloves every year." The nearly square piece cut off is folded over upon itself, giving a little more width for the side designed for the back of the hand; and upon this oblong double strip, the workman, measuring with his eye and finger, marks out the length for the clefts between the fingers, which he proceeds to cut and shape. Making the hole for the thumb is a matter requiring the greatest skill, for a very slight deviation from the exact shape would cause a bad fit when the parts are sewed together, resulting in unequal strain and speedy fracture when the glove is worn. By late improvements, introduced by M. Jouvin, the thumb piece, like the fingers, is of the same piece with the rest of the glove, requiring no seam for its attachment. The cutting also is performed in great part by punches of appropriate patterns, and some of these are provided with a toothed apparatus somewhat resembling a comb, which pricks the points for



the stitches. The seams are sewed with perfect regularity by placing the edges to be united in the jaws of a vice, which terminates in fine brass teeth like those of a comb, but only  $\frac{1}{4}$  of an inch long. Between these the needle is passed in successive stitches. When the sewing is completed the gloves are stretched, then placed in linen cloth, slightly damp, and beaten, by which they are rendered softer and more flexible. The last operation is pressing.—The chief branch of the manufacture carried on in the United States is that of buckskin gloves, a kind of glove more peculiarly American than any other; and the most important seat of this business is at Gloversville, Fulton co., N. Y.

GLOVER, RICHARD, an English poet and politician, born in London in 1712, died in 1785. He was educated for a mercantile life, but early manifested a love of letters, and at the age of 16 wrote a poem to the memory of Newton. In 1787 he published an epic on the Persian invasion of Greece, entitled "Leonidas," which was thought to have an application to English politics, and was for a time much admired. A continuation to it, under the title of the "Atheniad," appeared in 1787. His "London, or the Progress of Commerce," and a ballad called "Hosier's Ghost" (1789), were written to rouse his countrymen to a war with Spain. He was active in politics as an opponent of Walpole, and was returned to parliament for Weymouth in 1760. He wrote several tragedies, and a diary which was published in 1818, and in the following year an "Inquiry" appeared attempting to prove that he was the author of the letters of Junius.

GLOW-WORM, a name given to the female of several sericicorn beetles, of the genus *lampyrus* (Fab.). The antennæ are short, with cylindrical and compressed articulations; the head is concealed beneath the anterior margin of the thorax; the eyes and the mouth are small; the body is rather soft and depressed, with the sides of the abdomen serrated; the elytra are coriaceous and slightly flexible. The females are wingless, with rudiments of elytra at the base of the abdomen, and their general appearance to the uneducated eye is that of a worm, explaining fully the popular name of glow-worm in England and *ver luisant* in France. In the old Linnæan genus *lampyrus* there were as many as 60 species, which have been distributed into different genera, so that there were only 9 species left in the genus in the last edition of Dejean's catalogue. There are 4 well known species of glow-worm in Europe, *L. noctiluca*, *Italica*, *splendidula*, and *hemiptera*; the second is probably the species whose luminous faculty was known to the ancients, the *λάντρουπος* of the Greeks and *cicindela* of the Romans. Both sexes are luminous, though the light is strongest in the female; the light does not come from the thorax as in the fire-fly (*steler*), but from the posterior part of the abdomen on its upper and under surfaces. The English glow-worm (*L. noctiluca*, Linn.) is the largest European spe-

cies, about  $\frac{3}{4}$  of an inch long in the male, and the female about an inch; the male is brownish gray, with a reddish gray margin on the superior portion of the thorax, and has both wings and elytra; the female is wingless, of a uniform yellow white, with a very thin skin below; in both sexes the luminous spots show themselves as 4 bright points, 2 on the antepenultimate abdominal segment and 2 on the next posterior. The *L. Italica* is next in size, and is found in southern Europe, as the first is in the northern countries; the color is black, with red prothorax and legs; both sexes are winged, and much resemble each other, the apterous females spoken of by some entomologists being the larvæ. The *L. splendidula* is common in Germany; the male is winged, of a brown gray color with a bright glassy spot on the convex margin of the prothorax; the female, of a whitish yellow color with a brown spot on the centre of the prothorax, has no wings and very short oval elytra; the luminous spots are 2 transverse bands on the lower surface of the 2 penultimate abdominal segments, and in the female the whole abdomen diffuses a weak light. *L. hemiptera*, a southern species and the smallest,  $\frac{1}{4}$  of an inch long, is of an opaque black color, lighter in the female, the posterior ventral plates being whitish; the males have truncated elytra, the females none; the light is diffused from 2 round spots on the penultimate segment; the larvæ are probably luminous, as those of the preceding species were found to be by Burmeister. The first 3 species conceal themselves in the daytime and appear at night, the males flying about in the warm summer evenings, while the females betray their situations by their tranquil light among the shrubs; the last species creeps also by day, especially in damp weather, appearing toward the end of April; the 3d species occurs about the end of May and the beginning of June, while the 1st is found most abundantly toward the end of summer. The light is greenish or more commonly bluish white, intermittent or continuous at the will of the insect, extinguished in time of danger, and increased by active motion, sexual excitement, or artificial heat; it may continue some hours after death, and when lost may be reproduced by warm water; poisonous gases destroy the light with life, while oxygen increases its brilliancy; electricity produces no effect on the light, while galvanism increases or reproduces it in dead insects. The researches of Kolliker and others show that at the shining spots is found a whitish, transparent, fatty mass, permeated by very numerous tracheæ; this mass will shine when removed from the body, and in warm water for a long time, and its particles rubbed upon the fingers display a light resembling that from phosphorized mixtures. This insect, from the beauty of its light, has always excited the wonder and admiration of mankind, and has been the subject of many exaggerated stories and not a few exquisite poems, and in the minds of the country residents in England

is associated with the most pleasing recollections of calm summer evenings and lovers' walks in the springtime of life. The eggs of the glow-worm, the larva, and the nymphs, are luminous; the eggs are hatched after a few weeks, and the larva resemble the perfect females, having a body of 12 segments, the first 3 of which bear each a pair of feet; the head is small, and, like the caudal segments, retractile; they thrive well in captivity when kept in moist earth or herbage, and supplied with slugs and snails, which they kill with their arched and sharp-pointed jaws, and eagerly devour; about a week is occupied in assuming the state of nymph, and in about 8 days longer they appear as perfect insects. The nymph is larger than the larva, but not quite so long; the color is at first pale yellow, with two reddish spots on the posterior part of the thorax and the segments, but the dull color of the perfect insect is visible toward the end of the nymph state; the larval jaws disappear, and the antennae are seen to have 11 joints, and the tarsi 5; the last abdominal rings are very brilliant, and indeed the whole body seems phosphorescent. According to Dufour, the alimentary canal of the perfect female is twice as long as the body, and the cesophagus exceedingly short, immediately dilating into a short crop. The substance from which the luminous property is derived has been often made the subject of experiment, but as yet, according to Matteucci, without the detection of any phosphorus in it, though the circumstances attending the light resemble the conditions under which this substance is luminous, being increased by warmth, diminished by cold, and destroyed by irrespirable gases, oil, alcohol, acids, and strong saline solutions; these phenomena admit of a better explanation on Matteucci's theory. This author, in his *Leçons sur les phénomènes physiques des corps vivants*, explains all cases of animal phosphorescence on physico-chemical principles, regarding this as one of those singular mysteries of nature, seemingly introduced among the phenomena of life to lead man to consider and admire the power of the Creator. From his experiments we know that the light of the glow-worm may cease before the death of the animal, or may be considerably prolonged after this event; that the light is without heat, as far as our rude instruments can detect; that it ceases soonest in carbonic acid, and in hydrogen in from 20 to 40 minutes; that it is increased in oxygen, and lasts 8 times as long as in other gases, both for parts and for the entire insect; that it consumes a portion of oxygen, which is replaced by carbonic acid, and is therefore the product of a true combustion; that when not shining, and in contact with oxygen, none of this gas is taken up, and no carbonic acid is formed; that heat to a certain extent increases, while cold diminishes its brightness; that when the luminous substance has been altered by too great heat or the action of gases so as to lose its phosphorescence, this property cannot be reestablished; finally, that carbon, and not phosphorus,

is one of the elements of this substance, and that the phosphorescence is produced by the combination of the carbon with oxygen. The luminous matter from the living insect, according to the same author, has a peculiar odor resembling that of the perspiration of the feet; it is neither acid nor alkaline, dries rapidly in the air, seems to coagulate in contact with dilute acids, is not sensibly soluble in alcohol, ether, or weak alkaline solutions, but is dissolved in concentrated sulphuric and hydrochloric acids with the aid of heat; chemical tests exclude the idea of the presence of albumen, and the ordinary ammoniacal products are disengaged by heat. The oxygen of the atmosphere introduced by the numerous tracheae comes in contact with this substance, *sui generis*, composed principally of carbon, hydrogen, oxygen, and nitrogen. There are other instances of combustion of organic substances in contact with the air, which absorb oxygen and give out carbonic acid—as, for instance, wood and fish in process of decay, greased cotton, and charcoal in a minute state of subdivision—in none of which phosphorus is present; the heat disengaged is so small and escapes so readily, that there is not sufficient accumulation in most of these cases to be indicated by our thermometers. The phosphorescence of the sea is owing to minute organisms, which become luminous under certain physico-chemical conditions not satisfactorily determined; the annals of medicine furnished well attested cases of the appearance of flame arising from the bodies of the sick, before the days of mesmerism, and of phosphorescent transpiration of the feet, which are interesting in connection with the above mentioned odor in the glow-worm; these, and other similar facts, are at present not at all explained. According to some botanists, the heat developed during the flowering of plants is sometimes accompanied by phosphorescence. The intermittence of the glow-worm's light, and its sudden changes from darkness to brightness, as far as present investigations go, are dependent on the different amounts of air introduced into the tracheae, and the varying activity of respiration and muscular action. The change in the food of the glow-worm, from animal juices in the larva state to tender plants in the perfect condition, explains the contradictory statements of authors as to the habits of this insect; and the failure of the attempts to introduce it as an ornament to shrubberies and lawns has generally arisen from ignorance of the fact that the larva cannot be raised on vegetable food alone; beside moist herbage or damp earth, minute land shells must be supplied.—Phosphorescence has been noticed in annelids and star-fishes (*ophiura*); this property has been explained by Quatrefages as depending on the irritability of the muscular fibres. A few specimens of an articulated animal which may be called a glow-worm have been of late years found in the summer season in various parts of southern New England. The following descrip-

tion will give an idea of the creature: the head is small and flat, with very short antennæ; the color is cream-white, the length about 14 lines, and the whole of this is lighted up at night with a permanent luminousness less than that of the elaters of the West Indies; the light begins to show itself between the segments, of which there are 12, and at the stigmata, from which it spreads until the whole animal is illuminated, seeming a stick of light without joints or stigmata; most brilliant soon after midnight, they gradually fade to the ordinary whitish color at daybreak.—In all these cases of phosphorescent articulates, it is difficult to say what is the precise purpose of the light, whether to illuminate their path, to enable their companions to find them, or to inspire fear in their numerous enemies. (See FIRE-FLY.)

GLUCINA (Gr. γλυκύς, sweet), an earth, first obtained by Vauquelin in 1798, consisting, according to Berzelius, of 2 atoms of the metal glucinum, united with 8 atoms of oxygen; but Awdew and others regard it as a protoxide, GIO. It is found only in a few minerals, as the emerald, beryl, euclase, &c., being contained in the first two in the proportion of 18½ per cent., combined with silicic acid. It is obtained in the form of a white powder, of specific gravity about 3, closely resembling alumina. It is distinguished by its solubility, when freshly prepared, in a cold solution of carbonate of ammonia, and by its tendency to form a carbonate by exposure to the air; also by not giving a blue color in the blowpipe test with nitrate of cobalt. The properties of glucinum, the metallic base of glucina, have been recently investigated by Debray (*Annales de chimie physique* [8], xliv. 5), who obtained it from the chloride by reduction with sodium, the original source being the emerald of Limoges. Its properties differ from those before given by Wöhler, who obtained it in a platinum crucible. He found it a white malleable metal, that could be rolled in sheets like gold, of density 2.1, its melting point below that of silver. It cannot be made to burn in pure oxygen, but appears in the trial to be slightly oxidized on the surface, by which it is protected from further change. It resists the action of sulphur, but combines with chlorine and iodine. Its alloy with silicium is a hard brittle substance, susceptible of a high polish. Glucinum is soluble in sulphuric and in hydrochloric acids, hydrogen being evolved. Nitric acid acts upon it only when heated, and then slowly. It dissolves in caustic potash. Its symbol is G; chemical equivalent, 4.7.

GLUCK, CHRISTOPH WILHELM VON, the regenerator of the modern musical opera, known in literature as the Chevalier or Ritter von Gluck, was the eldest son of Alexander and Anna Walburga Gluck, born at Weidenwang in the upper Palatinate, not many miles from the Bohemian boundary, July 2, 1714, died in Vienna, Nov. 15, 1787. It is proper to state here that the dates and other particulars in this article, which the reader may note as different from those

usually given in biographical notices of Gluck, are drawn from documentary evidence substantiated or first given to the public by Anton Schmid, of the imperial library at Vienna, in 1854 (*Glucks Leben und tonkünstlerisches Wirken*). Alexander Johannes Klukh, the father (as he always wrote his name), began life as huntsman of Prince Eugene of Savoy, afterward removing to Weidenwang as forester, where his son, the future composer, was born. In 1717 he entered the service of Count Kannitz in North Bohemia, in 1722 was appointed chief forester by Count Kinsky, in 1724 entered the service of Prince Lobkowitz at Eisenberg, and closed his career in 1747 at Reichstadt in the service of the grand duchess of Tuscany. Thus the young Christoph came into Bohemia at the age of 8 years, to the land which, owing to its great number of wealthy nobles and convents, was in the early part of the last century the most favorable to the development of musical talent. At that period, in the gymnasia and the Jesuit colleges, music was earnestly cultivated, and every nobleman had his musical chapel; all churches of any pretensions, very many of the smaller parish churches even, had their choirs, supported by ample funds. The treatment of Gluck and his brothers by the father was hard even to tyranny; the composer in his old age well remembered being forced with his brother Anton to follow his father in the coldest winter weather into the forests, sometimes barefoot "to make them tough." The children had the best school instruction in Kannitz and Eisenberg, and from his 12th to his 18th year Christoph was sent to the gymnasium at Komotau. The boy carried with him a good degree of knowledge both in singing and playing bowed instruments, and in the school of the Jesuits his musical talents were specially cultivated. He became a chorister in the principal church of the place, and gained some knowledge of the harpsichord and organ. At 18 years of age he finished his gymnasial course, and went to Prague to enter the university. His studies were not long continued there, for with the increase of his father's family the pecuniary aid from home became less and less, until the student was at length obliged to devote himself to music for his subsistence. He gave lessons in singing and upon the violoncello, sang and played in several of the principal churches for a small monthly salary, and during vacations sang and played in the villages of the surrounding country, sometimes being paid in one with eggs, which in another he exchanged for bread. So in time he gained skill and confidence to appear in larger towns as a virtuoso upon the violoncello, no more dreaming of the great future before him than Haydn did when playing with the street orchestra of Vienna 16 or 18 years later. By degrees the youth attracted the attention of the Bohemian nobles, and the family of Prince Lobkowitz became in an especial manner his protectors. When therefore in 1736 his love of music and desire for better opportunity of

study carried him to Vienna, the house of the prince was opened to him, and a salary was given which enabled him at length, at the age of 22, to enter upon the study of the fundamental principles of musical science. He now had opportunity also to hear the works of Fux, Caldara, the brothers Conti, Porcile, and other great dramatic and church composers, adequately performed—works which filled him with astonishment and delight, and aroused an ambition some time to be able to equal them. The Lombard prince di Melzi, hearing Gluck both as a singer and violinist, in the soirées of Lobkowitz, was so pleased with him as to appoint him chamber musician, take him to Milan, and place him under Sammartini, at that time a famous director, organist, and composer. This life of laborious study and musical practice in the house of the prince continued 4 years, during which the young German had given so many proofs of his talent in composition, that in 1740 he received an order to compose an opera for the court theatre of Milan. Feeling himself now equal to the work, he gladly accepted it. The old field of the Italian opera of Handel's time had now been nearly exhausted, and the works of the day, even those of the greatest masters, had gone down in the scale until they were little more than pieces of music written to give the singers opportunities to exhibit their powers. Real musical expression was one of the last things which entered into the thoughts of the composer. Hence the first work of Gluck, though not that in which he really opened a new era for the lyric stage, has an importance in musical history beyond any other of that time, unless the oratorios of Handel be excepted. The text chosen for him was the *Artaserse* of Metastasio, a libretto which in its form was sufficient—in case Gluck had then, which he had not, thought out the system which he afterward adopted and which produced an entire revolution in the musical drama—to have prevented him from striking out an entirely new path. Still the composer had an indistinct feeling of the hollowness and insufficiency of the then recognized forms of dramatic composition, and ventured to depart from them so far as possible, and make expression the great object of his music. He completed the work, with the exception of one air, in his own manner, and in 1741 had it in study. At the first rehearsal in the theatre a large company was present, full of curiosity and burning impatience to hear the new work. It proved so different from what they were accustomed to hear as to be generally received with smiles, and shrugs, and jokes upon the German composer. Gluck let all pass without remark. For the final rehearsal he composed the wanting air in the strictest style of the day. It was a beautiful piece for the singer, and when the audience heard it, they broke into the loudest applause, and with one consent attributed it to Sammartini. Gluck remained silent. The first public performance came off with appropriate scenery and action.

The house was crowded. The interest arose with every number, the music meeting with the most decided success, until the modish air, which proved so "stale, flat, and unprofitable," so out of character with all the rest, that Gluck had to withdraw it and substitute one more in the spirit of his work. The success was triumphant, and the composer was called from city to city of Italy to direct the *Artaserse*. He was now the great operatic composer of that era. In 1742 he wrote *Demofonte*, text by Metastasio, for Milan; *Demetrio* and *Ipermestra*, texts by the same, for Venice; in 1743, *Artamene* for Cremona, and *Siface* for Milan; in 1744, *Fedra* for Milan; in 1745, *Alessandro nell'India*, by Metastasio, under the title *Poro*, for Turin. His fame had now extended through Europe, and Lord Middlesex invited him to London to compose for the theatre in the Haymarket. In 1745 Gluck set out in company with Prince Lobkowitz for the English capital, but upon his arrival found the theatre closed. On Jan. 7, 1746, however, it was again opened, and with *La caduta de' giganti*, written in honor of, and performed before, the duke of Cumberland, music by Gluck. Burney describes this performance, and explains the ill success of the music as owing wholly to its inadequate representation. Even under this load it lived through 5 representations. The often quoted remark of Handel, that Gluck knew as much of counterpoint as his cook, deserves a word of notice. Gluck was not of the Saxon school, of which Handel and Bach are the two great names; nor does one go now even to his greatest works for distinguished examples in the contrapuntal style of composition. His excellences are of another order. The work of a still young man may have very naturally appeared feeble to Handel, who then looked upon music with the judgment of a man of 60 years. Handel's good will to Gluck is proved by an anecdote which Reichardt heard in London. Gluck, dissatisfied with the ill success of *La caduta de' giganti*, complained to Handel, and showed him the score. Handel said: "You have taken too much pains with your opera, that's all; that should not be done here; for Englishmen, you must think of something striking—something that hits right upon the drum head." This is said to have led Gluck to add trombones to the choruses, and with good results. The *Artamene* was afterward given very successfully. This journey to England was in fact the turning point in Gluck's life, although the fruits of his study and observation did not appear in full for many years. On his way to London he had remained some time in Paris, and there had opportunity to study the tragic declamation and extraordinary truth of expression in the works of Rameau, which wrought powerfully upon his imagination, and strengthened his own half-developed theory of operatic composition. In London the majestic character of both melody and harmony in Handel's oratorios, and the simple but natural dramatic style of Dr. Arne, made an equally deep impression. To all this

must be added the effective and dramatic use of chorus and ballad in the opera of Rameau. Here were so many means of the highest dramatic effects, each new, each worthy of being made his own, but not alone. The problem arose in his mind how to join them all in one magnificent whole. Before he left London he had a notable proof that the principle which lay at the groundwork of his first opera—that of composing music with regard alone to the expression of the passion and situation of the moment upon the stage—was a correct one. In addition to the two operas above named, he had been commissioned by the London managers to prepare a *pasticcio*, *Pyramo e Tisbe*, that is, to adapt from other operas music to this new text. In doing this, he selected from his works none but the pieces which had been most highly applauded, and had become favorites with his audiences. These he adapted with all the skill and science of which he was master; but to his surprise, astonishment even, he found that with a new text, new action, and new situations, the music seemed to have lost all its power. He concluded from this that all really successful operatic music, having a higher aim than merely to please the ear, is necessarily of a character which unfits it for any other text and situation than that to which it owes its origin. Having thus arrived at a fundamental principle of dramatic composition, he took this as a starting point, and gradually wrought out a system, upon which, at a future period, he was to base the success of a series of imperishable operatic works. The leading points of this system are: 1, that dramatic music can only reach its highest power and beauty when joined to a text simple, truly poetic, and exhibiting natural and definite emotions and passions with the highest possible truth to nature; 2, that music might be made the language of emotion, capable of expressing the various feelings of the heart; 3, that the music must follow with all possible exactness the rhythm and melody of the words; 4, that in accompaniments, the instruments must be used to strengthen the expression of the vocal parts by their peculiar characters, or to heighten the general dramatic effect, by employing them in contrast to the voice, as the text or dramatic situation might demand. From these principles it followed that the beautiful arias, which then were held to be the highest efforts of the musical art, though in fact unsurpassable as means of sensual gratification to the ear, so perfect were many of them in form and delicious melody, could never deeply touch the soul nor rouse any lasting emotion. In his later years Gluck was in the habit of saying, when an air of this kind was commended: "Yes, it is right beautiful; but it does not draw blood." The composer left London toward the close of 1746, and returned to Germany. Dlahacz says he became a member of the electoral orchestra of Dresden with a respectable salary, which seems probable, but in fact none of the biographers

have cleared up the chronology of his life for the 2 or 3 years after his return. On June 29, 1747, an opera in one act, *Le nozze d'Ercole e d'Ebe*, music by Gluck, was performed at Pilnitz, a few miles above Dresden, in honor of the marriage of Princess Anna, daughter of Augustus III. According to Schmid, *La Sémiramide riconosciuta*, text by Metastasio, music by Gluck, was performed at Vienna on Maria Theresa's birthday, May 14, 1748; and in the autumn of the same year a newspaper contains a paragraph of news from Hamburg, which is dated Oct. 8, and says: "Herr Gluck, so well known in music, is at present capellmeister here in place of Scalabrini." In 1749 he was called to Bohemia by the death of his father, and after settling the small estate left by him, went once more to Vienna, which city he made henceforth his home, only leaving it when called to Italy and Paris to produce his works. In the Austrian capital he soon became a welcome guest in all the musical circles, not more from his great excellence as a singer and a virtuoso upon the violin or violoncello, and from his fame as a composer, than from his great social talents. In the house of Joseph Pergin, a banker and wholesale merchant, he was received both as a friend and as music teacher of the two daughters. With Marianne he fell in love, and his passion was returned. The mother approved the match, but when the young man applied to the father for the hand of his daughter, he was rudely refused, as being but a musician, and with no prospect of being able to support the young lady in a style fitted to her rank and position. Surprised and deeply wounded, Gluck gladly accepted an order to compose *Telemaco* for the theatre Argentina at Rome, and left Vienna at once, in such haste to be away, that, without waiting for his passport, he smuggled himself across the boundary in the habit of a Capuchin monk. In 1750 news came to him that Pergin was dead. As soon as his opera was upon the stage, where it, like all his other works, was successful, he hastened back to Vienna, and on Sept. 15 celebrated his marriage with Marianne. The marriage proved childless, but few have been happier, and seldom even during his longest and most tedious journeys were Gluck and his wife separated. In 1751 he visited Naples, to produce his *Clemenza di Tito*; in 1754 he composed *Le Cinesi*, a fantastic production, performed at Schlossohof before the emperor and Maria Theresa; and the same year he was appointed chapelmaster of the imperial opera at Vienna, which office he held until 1764. Before the close of the year he was again called to Rome, and produced there *Il trionfo di Camillo* and *Antigono*, which gained him from the pope the order of knight of the golden spur. Hence his title in musical history, Chevalier or Ritter. In 1755 he produced the music to Metastasio's *La danza*; in 1756, *L'innocenza giustificata* in one act, and *Il re pastore* in three. Between

1755 and 1762 he composed also a great number of airs and other pieces for a series of 10 French operettas and vaudevilles performed in Vienna, at the same time laboring heroically to make up for the deficiencies of his early education. In 1760 his principal work was *Teside*, a serenata composed for the nuptials of the archduke Joseph; and in 1761 a most successful ballet, *Don Juan*, or *Das steinerne Gastmahl*, founded upon the same fable afterward employed by Da Ponte in his text to Mozart's immortal opera. In 1762, *Il trionfo di Clelia* was composed at Bologna, met with the invariable success of Gluck's productions, and then its author returned to Vienna to enter upon his new path. However satisfied the public was with his music, he was not so. He felt himself continually cramped by the character of Metastasio's libretti, which were rather lyric dramatic poems—though of the highest excellence in their kind—than true dramas. Two years before his journey to Bologna, Gluck had opened his mind upon this subject to Raniero Calzabigi, a councillor in the department of finance, and discussed it with him in all its length and breadth. Calzabigi, himself a poet, had long felt the defects of which Gluck complained, was rejoiced to find the views of so eminent a composer correspond so perfectly with his own, and promised to prepare a text which should enable the musician to bring their common views to the public test. Upon his return from Italy Gluck found ready for him the libretto of *Orfeo ed Euridice*. The poem differed so completely in construction from the Metastasian type, which then alone was recognized as classic throughout Europe, that Calzabigi was not without anxiety lest this fact should prove sufficient to insure its condemnation. A word against it from the old dramatic autocrat would suffice for this. He accordingly called upon Metastasio, and requested him not to declare himself openly against the new style adopted. The poet confessed himself dissatisfied with it, but consented to hold his peace—"the work would speak for itself." It would not be easy to find in musical history another case in which a new style of dramatic lyric composition, new ideas and principles, have been subjected to so severe a test as in this. Orpheus, Eurydice, and, in two or three short scenes, Amor, are the only characters represented. At the beginning and end a chorus of Greeks, in Tartarus a chorus of shades and demons, in Elysium a chorus of blest spirits, each occupying a single scene, with choral music and ballet, is all that divides the attention from the three leading characters. The subject, opening with a chorus at the tomb, lamenting the death of Eurydice, is the familiar myth, only changed at the close, where Amor appears and finally restores the beloved one to Orpheus. There is but little action, and that of the simplest character. Every thing depended upon exciting the sympathies of the audience at the outset, and holding them to the end, and this too by

musical means as new and strange then as those of the old Handelian opera would appear to us. Twice in this work Gluck has shown the daring of genius trusting to its own powers, in a manner not surpassed by Beethoven himself. At the close of the first chorus Orpheus dismisses his friends, and is left alone not merely to execute a recitative and single air, written expressly for the singer to exhibit his powers, but a series of them, in which not an ornament or cadenza is admitted, and which nothing but the depths of expression in Gluck's music could redeem even now from the fatal fault of tedium. The other case is that in which Orpheus entering Tartarus is confronted by demons and shades, who by the force of his music at length are led to give way and allow him to pass on to Elysium. The problem for Gluck to solve was so to write that the auditor might feel the means equal to the end. A failure here would have exposed the composer to a ridicule which would have condemned his work, and his theory too perhaps, for ever. On Oct. 5, 1762, the opera was performed in public. Surprise and astonishment were the emotions with which the audience left the house. All hearts had been strangely moved. It had interested the company from the first singer to the most insignificant dancer in the ballet, and was given with rare perfection, and, strangely enough, just as Gluck desired—no cabala, no rebellion against his authority. The novelty of the style was soon forgotten. The music made its way to all hearts, it became a most popular work in Vienna, and now, at the close of a century since its production, is still a stock piece in Berlin, having lost no particle of its freshness and pathos. In the next 8 years, 1763, '4, '5, Gluck composed *Ensis*, text by Metastasio; *La rencontre imprévue*, text by L. H. Dancovot (afterward very popular in a German translation with the title *Die Pilgrime von Mekka*); *Il Parnasso confuso*, a dramatic poem by Metastasio, performed in the palace at Schönbrunn by the 4 daughters of Maria Theresa, sisters of Maria Antoinette, their brother, the future emperor Joseph, playing the harpsichord; revised *Telemacco* for the Vienna stage, and composed *La corona* for the archduchesses. The last piece was never performed, owing to the sudden death of the emperor Francis. None of these works, although they gave Gluck opportunity to prove his inexhaustible fund of melodic and harmonic beauty, were such in dramatic form as enabled him to follow the path struck out in the *Orfeo*. In the mean time Calzabigi had prepared another text for him, founded upon the *Alceste* of Euripides. Admetus, king of Phera, is attacked by a mortal illness. Apollo obtains from the Fates a promise of his recovery if any one can be found to die in his stead. Alceste, the queen, offers to die for him, parts from her husband and children, but is at length saved by Hercules, and restored to them. On this slight framework the poet succeeded in building a drama full of feeling, and one which offered a great

variety of scenes and passions for the inspiration of the composer. The promise of the *Orfeo* was more than fulfilled. But it was not until after several performances that the public learned to understand and appreciate it. Then indeed admiration rose to the point of enthusiasm. In 1769 the *Alceste* was printed in score, with the celebrated dedicatory epistle to the grand duke of Tuscany, in which the composer ventured, after so successfully applying the test of experiment, to announce to the world the new principles of dramatic musical composition, which he had now reduced to a system. "When I undertook to set the opera *Alceste* to music," he writes, "I purposed carefully to avoid all those abuses which the mistaken vanity of the singers, and the too great good nature of composers, had introduced into the Italian opera; abuses which reduced one of the noblest and most beautiful forms of the drama to the most tedious and ridiculous. I sought therefore to bring back music to its true sphere, that is, to add to the force of the poetry, to strengthen the expression of the emotions and the interest of the situations, without interrupting the action or deforming the music by useless ornamentation. I was of opinion that the music must be to the poetry what liveliness of color and a happy mixture of light and shade are for a faultless and well-arranged drawing, which serve only to add life to the figures without injuring the outlines. I have therefore taken care not to interrupt the actor in the fire of his dialogue, and compel him to wait for the performance of some long tedious ritornello, or in the midst of a phrase suddenly hold him fast at some favorable vowel sound, that he may have opportunity by some long passage to exhibit his voice, or make him wait while the orchestra gives him time to get breath for some long *fermate*. Nor have I thought myself at liberty to hurry over the second part of an aria, when perhaps this is just the most passionate and important part of the text, and this only to allow the customary repetition of the words four times; and just as little have I allowed myself to bring the aria to an end where there was no pause in the sense, just to gain an opportunity for the singer to show his skill in varying a passage. Enough; I wished to banish all those abuses against which sound common sense and true taste have so long contended in vain. I am of opinion that the overture should prepare the auditors for the character of the action which is to be presented, and hint at the progress of the same; that the instruments must be ever employed in proportion only to the degree of interest and passion; and the composer should avoid too marked a disparity in the dialogue between air and recitative, in order not to break the sense of a period, or interrupt in a wrong place the energy of the action. Further, I considered myself bound to devote a great share of my pains to the attainment of a noble simplicity; therefore I also avoided an ostentatious heaping up of difficulties at the expense of

clearness; I have not valued in the least a new thought if it was not awakened by the situation and did not give the proper expression. Finally, I have even felt compelled to sacrifice rules to the improvement of the effect." In 1769 Gluck produced a 8d opera in the new style, *Paride ed Elena*, text by Calzabigi. Since 1764 he had been free from the cares and duties of chapel-master, and was able to devote all his energies and studies to his operas. The result, as we have stated, was, in the case of the *Alceste*, all that he could wish at home, in Vienna; in the new opera, although the music is equally masterly, the subject was unfortunate, and, as a drama, not of particular interest to the public. It became popular, therefore, only with musicians, and has in late years never been revived. The next year he published it in score, and in dedicatory epistles addressed to the duke of Braganza defended himself and his system against the attacks of the north German critics, whom he charged with pretending to judge of music written with a single eye to effect upon a grand stage, with every accessory studied to perfection, after hearing it inadequately performed, without due rehearsals and with imperfect properties and machinery, or what was still worse, after running the score through in a chamber at the pianoforte. Soon after producing the *Paride ed Elena* (1769), Gluck was called to Parma to compose festival music upon occasion of the marriage of the grand duke to Maria Amalia, daughter of Maria Theresa. Instead of a long opera, divided into acts, 4 short one-act pieces were prepared, *Le feste di Apollo*, *L'atto di Bauli e Filemone*, *L'atto d'Aristeo*, and for the 4th the *Orfeo* given in 7 scenes. The first 3, in the Italian style, were undertaken by the singers with delight, and awaited by the public with the brightest anticipations; but people shook their heads at the idea of a piece which in its construction ignored the principles of Metastasio, however much it might have delighted a German audience, being served up before the Italian public. Millico, the contralto, when the part of Orpheus was brought to him to study, shed tears that he was compelled to undertake a part which, as he thought, could do him no honor. Studying it, however, with Gluck himself, he soon felt its power. It became a masterpiece of singing and action in his hands, and his love and admiration for the composer became so strong that he afterward followed him to Vienna. The public, too, became so captivated with it that they utterly refused to hear the *Armida* of Fraetta, which the directors of the theatre some time afterward announced in place of the *Orfeo*. Gluck returned to Vienna, and remained there now several years, one of the marked men of the capital, one of the ornaments of the best society, whose house no stranger of distinction failed to visit. During this time he composed nothing for the stage, though his pen was not idle. He set many songs and odes of Klopstock, and some scenes of his

*Hermannsschlacht*, to music. But his mind was still dwelling upon the reform of the opera. Successful as his 3 operas in the new style had proved, he was not himself satisfied that he had succeeded in putting his system to such a test that it could admit of no further dispute. There existed at that epoch, so at least Gluck believed, but one stage in Europe, which, from the superiority of its singers, both as vocalists and actors, from the splendor of its decorations and the perfection of its machinery, the number of its chorists and dancers, and the great size and fine execution of its orchestra, offered to the composer all that he could in reason demand. This was the royal opera at Paris, and the idea of composing a tragic opera on the grandest scale for its boards, upon which he might lavish all the resources of his genius and the studies and experience of a life, now of nearly 60 years, was one which gained continually a more complete possession of his thoughts. At this time a French gentleman of genius and a highly cultivated taste, Bailly du Rollet, whom Gluck had known long before in Rome, was in Vienna, an attaché of the French legation in that city. With all his prejudices in favor of French music, which then formed a much more distinct school than in our days, Du Rollet was wonderfully impressed by the ideas of Gluck, and by the 8 operas in which those ideas had been exemplified. The magnificent *Iphigénie en Aulide* of Racine seemed to Gluck to offer a subject worthy of his highest efforts, and this Du Rollet undertook to reduce to a suitable form for musical composition. His task was completed to the satisfaction of the composer, who now laid aside everything else, devoting himself exclusively to the study of his text. He first perfected his plan from beginning to end, so that by no possibility could there be any want of due proportion in the parts. Not until this labor was fully perfected did he begin upon the music. In the style which he adopted he followed Rameau and the other best French models just so far as this was possible without invading the principles of dramatic composition, as explained by himself in his dedicatory epistles. When Dr. Burney visited Vienna in 1772, the *Iphigénie* was finished, but only a few of the finest scenes were committed to paper; the rest was retained in the memory of the composer. These scenes, however, had been performed in presence of the court, and had fully met the highest anticipations. On Aug. 1, 1772, Du Rollet wrote to D'Auvergne, a director of the Paris opera, giving an account of Gluck and his system, and a description of the new opera *Iphigénie en Aulide*. Instead of answering this letter, D'Auvergne printed it in the October number of the *Mercury de France*. In Feb. 1772, Gluck sent an article to the *Mercury*, in which he speaks of himself and his works with great modesty, and from which we extract a single sentence only. He would have been glad, he says, to have composed this work in Paris, because he "might perhaps have found means

there to have realized one of the cherished thoughts of his soul, i. e., to write music which should be alike expressive to all nations, and thus have done his part toward putting an end to the ridiculous difference in national music." Meanwhile D'Auvergne had written to Bailly du Rollet, and had received from him the first act of the *Iphigénie* for examination. After examining it he wrote again to Du Rollet, and made this remarkable proposition: "If the Ritter Gluck would bind himself to compose 6 such operas for the Paris academy of music, he would be the first person to interest himself in bringing them upon the stage; otherwise, not; for one such opera would be a death blow to all the previous French operas." Reichardt is authority for this statement, he having heard the fact from both parties. Unable to effect any thing with the directors of the *académie*, Gluck addressed himself to Marie Antoinette, at that time dauphiness, who had formerly been his pupil, and his petition was accompanied by strong recommendations from Maria Theresa and Joseph. Marie Antoinette conquered all obstacles, and invited Gluck to Paris with his score, promising him her protection. Late in the summer of 1773 Gluck journeyed to Paris, accompanied by his wife and his niece (adopted daughter) Marianna. To his surprise and disappointment, in no one respect did the academy of music answer to the descriptions he had heard of it, the expectations he had formed. Singing, acting, chorus, orchestra, ballet, all were worse than merely bad. Rousseau's invectives and sarcasms at a previous period were as well deserved now. Gluck had composed the opera; he had now the herculean task of forming singers, actors, and an orchestra adequate to its performance. He said afterward that, if the composer received 30 livres for his opera, he ought to have 20,000 for producing it. Gluck was a man of indomitable energy, and having the protection of the court to fall back upon, he pursued plans of making the resources of the academy equal to his demands. So autumn and two-thirds of the winter passed, and Feb. 18 was fixed upon for the first performance of *Iphigénie*. His enemies had reserved their master-stroke for this day. When it was too late to change the programme of the evening, as the cabal supposed, it was announced that the first singer was suddenly taken sick. Gluck demanded the postponement of the performance. This was refused, on the ground especially that the court had been notified, and it must go on. The composer at once applied to the highest authority, and the directors were forced to comply with his request. On April 19, 1774, the performance took place. We have no space here to detail the history of the warfare which followed between the followers of the old school of opera and the converts to the new ideas of Gluck. The contest in Vienna had been, upon the whole, a local one. Transferred to Paris, it became a contest of the whole musical world. A catalogue of the writings of the Gluckists and Piccinists on the two



sides of this question would fill one of our pages. The final result was the complete victory of Gluck. The composer followed up the *Iphigénie* with the "Orpheus and Euridyce," adapted to the French stage, with the very material alteration of changing the part of Orpheus to that of a tenor, to suit the voice of Legros, there being no contralto adequate to it. The success of the work was as striking in Paris as in Vienna and Turin. In Feb. 1775, Gluck produced *L'arbre enchanté*, in one act, at Versailles, a work of no great importance, and written merely for a festival given by Marie Antoinette to her young brother Maximilian, afterward elector of Cologne. Soon afterward the composer returned to Vienna, making the acquaintance of Klopstock, which ripened into intimate friendship, on the way to Strasbourg. In August his *Cythere assiégée* was produced at the academy, but met with no distinguished success. The subject was not one to enlist the feelings of the composer in any great degree, nor did the actors and singers have the advantage of his personal instructions. In fact, the work mainly belonged to a former period. Meantime he was zealously engaged upon 8 works, an adaptation of *Alceste* to the Prussian stage, and the operas *Roland* and *Armide*, texts by Quinault. The *Roland* he laid aside upon hearing that it had also been intrusted to Piccini, and wrote a sharp letter to Bailly du Rollet, which, without the consent of the writer, was printed in the *Année littéraire*, and seemed to embitter the other party to a high degree. Early in 1776 Gluck was again in Paris with his *Alceste*. It was produced, and hissed off the stage. The unlucky composer, who had been behind the scenes, rushed from the opera house, and meeting a friend, threw himself into his arms in tears, exclaiming: "The *Alceste* is fallen!" "Yes," said his friend, "fallen from heaven!" As this ill success was mostly owing to cabals among the singers and the personal efforts of Gluck's opponents, and as the composer had influence enough to insure its repetition, it made its way with the public, and soon took its place only below the *Iphigénie* and the *Orfeo*. The war of the wits and critics was, however, more bitter than ever. Gluck himself seems to have been not a little embittered, and his polemical writings are oftentimes excessively keen. In the midst of his ill success with the *Alceste* came the afflicting news that his niece Marianna, whose ill health had caused him this time to visit Paris alone, had been carried off with the small pox. Marianna Hedler, by adoption of the composer named Gluck, was the daughter of Gluck's youngest sister. Upon her the childless musician lavished all a father's love. She had been a pupil of Millico, and when but a child, as Burney records, was already a songstress of wonderful powers; and at the age of 16, at which she died, was probably among the very first of living singers in all the nobler qualities. Her death was the great grief of Gluck's life. It was not until Sept. 28, 1777, that the *Armide*,

text by Quinault, from Tasso, was produced. It was rather coldly received, not being at once comprehended, but gained upon the public, and took the rank it still holds, being by many held to be the greatest composition of Gluck, and by others only inferior to his later work, the *Iphigénie en Tauride*. Again crowned with success, Gluck returned to Vienna to work upon a new text, *Iphigénie en Tauride*, by a young poet named Guilbard. In Nov. 1778, he was so far advanced with it that he returned to Paris, where on May 18, 1779, it was produced. Like Haydn's "Creation," written when he was nearly 70 years of age, this opera of Gluck, written at the age of 64, ranks among the highest efforts of the composer; with many, as before stated, it ranks the first. It was the work which made the profoundest impression when produced, and which held its place the longest in Paris. It is still in a German translation one of the favorite pieces upon the Berlin stage. It was the crowning triumph of Gluck's system of operatic writing, and ended the series of works which gave direction to the genius of Mehul and Cherubini in Paris, Mozart and Beethoven in Germany, in their works for the stage. Another piece brought by Gluck to Paris at this time was the *Écho et Narcisse*, the last of his dramatic works in order of performance, perhaps also in composition. It met with no great success. He returned to Vienna, but his life as an artist may be said to have ended. In 1788 he had an attack of apoplexy, which caused him to decline the text of *Les Danaïdes*, sent him from Paris, and give it to the young Salieri, who of all the rising composers was fullest of his spirit, and who owed to him his already great success as a composer. To his dramatic compositions Gluck added only for the church a *De Profundis*, a psalm, *Domine Dominus Noster*, and a part of the sacred cantata, finished by Salieri, *Le jugement dernier*. For months before his decease, Gluck had been obliged to use the greatest precautions to prevent a return of apoplexy. Finally, one day he invited two old Parisian friends to dine with him. After the meal, coffee and spirits were placed upon the table, and Madame Gluck went out to order the carriage for the daily drive prescribed by the physician. One of the friends excusing himself from emptying his glass, the host at last seized it, swallowed its contents, and laughingly told them not to let his wife know of it, as every thing of the kind was forbidden to him. The coach being ready, Madame Gluck invited the guests to amuse themselves in the garden for a short time. Gluck took leave of them at the coach door. It was his last adieu. Fifteen minutes afterward he had another stroke; the coachman hurried home; his master had already lost all consciousness, and a few hours later breathed his last.

GLÜCKSTADT, a town of Denmark, in the duchy of Holstein, on the right bank of the Elbe, 27 m. N. W. of Altona, the seat of various provincial courts; pop. 6,200. The inhab-

itants are chiefly engaged in commerce and the whale fishery. The town was founded in 1620 by Christian IV. It was formerly fortified, but its fortifications were demolished in 1814. It is connected by railway with Altona, Kiel, and Rendsburg. From this town is derived the name of Glückstadt, which was applied to the dukes of Holstein. The famous academy of the town was closed in 1858.

GLUE. See GELATINE.

GLUTEN, or VEGETABLE FIBRINE, a tough elastic substance, named from its adhesive glue-like property, an ingredient in wheat especially, and in smaller proportion in most of the cerealia and in some leguminous plants. When wheat flour is well kneaded upon a sieve under a stream of water, the soluble starch and sugar are washed away and the gluten remains behind. This was supposed by Beccaria, who first noticed it, to be a distinct principle; but it is found still to retain a little starch, and other ingredients are separated from it according to their different reactions when treated with boiling alcohol. The pure vegetable fibrine is then found to constitute about 72 per cent. of the original gluten, while an albuminous substance called gliadine, vegetable caseine, and a vegetable oil make up the remainder. Gluten from rye flour contains very little of the tenacious ingredient, gliadine; and other grains furnish gluten of variable proportions of its ingredients. It is gluten which gives to the dough of wheat flour its peculiar tenacity, and it is owing to this that the escape of carbonic acid gas is arrested in the fermentation of wheat bread, and the product is consequently lighter and more spongy than other bread. Macaroni and vermicelli are preparations of gluten, and the flour of the south of Europe is said to be peculiarly adapted for this manufacture, as it generally contains a considerably larger proportion of gluten than that grown further north. The proportion, however, is variable in wheat of the same vicinity, and it may be increased by the use of animal manures, especially those most rich in nitrogen. Liebig noticed that wheat manured with cow dung (which contains but little nitrogen) produced 11.95 per cent. of gluten; while another portion manured with human urine yielded the maximum of gluten, 35.1 per cent. Summer wheat grown in the *jardin des plantes* at Paris was found to contain 26.7 per cent. of gluten, while a sample of winter wheat gave but 8.83 per cent. As gluten is the most nutritious ingredient in the grains, its proportion has been carefully estimated by chemists. Vauquelin found it in wheat averaging 11.18 per cent.; Dumas, 12.50 per cent.; and Dr. Lewis O. Beck, from 33 samples gathered from different parts of the United States, found an average of 11.72, the range being from 9.85 to 15.25 per cent. Prof. Horsford, by ultimate analysis of the wheat, instead of separation of the gluten by mechanical washing, obtained an average of 15.14 per cent. from 6 samples. Payen found the proportions of gluten and other nitrogenous matters in

wheat to range from 11.20 to 22.75 per cent.; in rye, 13.15; barley, 13.96; oats, 14.39; corn meal, 12.50; rice, 7.05. Prof. Johnston found in English fine wheat flour 10, in bran of the same flour 18, in Scotch oatmeal 18, and in corn meal 12 per cent. of gluten. It is found by very careful and repeated analyses that the bran of wheat and of most other cereals is richer in gluten, and consequently more nutritious, than the rest of the grain. Hence the preference for flour that by thorough bolting has been most completely deprived of bran is unwise; and the whitest flour is less valuable for its nutritive qualities than that made from the whole grain. The bran sometimes constitutes  $\frac{1}{2}$  and more of the grain, and, according to the analyses of Prof. Johnston, contains 14 to 18 per cent. of gluten, while the fine flour contains only 10 per cent. Gluten is readily reduced in quantity, and its tenacity is diminished by injury to the grain. Flour dealers and bakers judge of the quality of flours by the tenacity of the dough made from a few grains of it. An instrument for determining the quality of gluten is described under ALEUROMETER.—The subject is further treated under ALIMENT, vol. i. p. 361.

GLUTTON, a carnivorous mammal, belonging to the family *mustelida*, sub-family *martina*, and genus *gulo* (Storr). The dental formula is that of the true martens, viz.: incisors  $\frac{3}{1}-\frac{3}{1}$ , canines  $\frac{1}{1}-\frac{1}{1}$ , premolars  $\frac{2}{1}-\frac{2}{1}$ , molars  $\frac{1}{1}-\frac{1}{1}=\frac{3}{3}$ , in all 88; the first 3 molars in the upper, and the first 4 in the lower jaw, are small, succeeded by a larger carnivorous tooth. In dentition and general structure the glutton resembles the martens; but in its shape, and partially plantigrade feet, it so much resembles a small bear that many writers have placed it among the *ursida*. The head is rather pointed and bear-like, the eyes and ears very small, the body long and stout, the legs short and robust, the claws large and sharp, the soles covered for the most part with bristly hairs, and the tail short and bushy. The glutton of Europe (*G. luscus*, Linn.) is about as large as a badger, of a deep brown color, darkest on the back. The voracity of this animal, as its name would imply, is great, though it has been much exaggerated. It is nocturnal, inhabits the coldest countries, as Russia and Siberia, and is active all winter. The American glutton, called also wolverene and carcajou, seems to be a paler variety of the *G. luscus*; the color is dark brown above, passing into black; a pale band runs on each side from the shoulder around the flanks, uniting on the hips; tail with long bushy hairs. The inner fur is soft and short, the outer long and coarse, like that of the black bear; across the forehead, on each side of the neck, and between the legs, are patches and tufts of white hairs. The average length to root of tail is 24 feet, the tail from 10 to 12 inches, and the height at shoulder about a foot; the width of the hind feet is nearly 5 inches, so that their tracks in the snow are not unlike those of the bear. The wolverene is confined almost exclusively to the northern

regions of the continent, being most abundant in the Rocky mountains near the arctic circle; it is occasionally seen in northern New York, and in the west has been found as far south as Great Salt lake. The strength, agility, cunning, and voracity attributed to the glutton by the older writers are mostly fabulous; it is by no means ferocious, is slow and heavy in its motions, not remarkably voracious, neither strong nor agile enough to pounce upon and kill deer and other large game, and avoids entering water in pursuit of prey. The wolverene generally hunts at night, spending the day in holes and caves; its food consists principally of small quadrupeds, such as mice, marmots, and other rodents, grouse and other birds which have plunged under the snow; there is no proof that it destroys the beaver, except occasionally; it may sometimes finish larger animals disabled by the hunter, by old age, or by accident, and when hard pressed will eat carrion. It is notorious for following the traps of the hunter, and stealing therefrom both the bait and the captured animal, and for digging up and destroying *caches* of provisions. The wolverene is very suspicious, and rarely caught except in carefully concealed steel traps; it is a very strong animal for its size, its weight being from 25 to 80 lbs. The young are produced once a year, 2 to 4 at a time. The fur of the wolverene is used for muffs and sleigh robes. The specific name *luscus* was given by Linnæus to an American animal, which happened to have but one eye; should the European glutton be separated from the wolverene, it would be properly called *G. borealis* (Nilsson).

GLYCERINE (Gr. γλυκός, sweet), the sweet principle of oils, the base of the compounds found in animal fats and also in some vegetable substances. Its composition is represented by the formula  $C_3H_5O_3 = 2(C_2H_5) + O_2 + .HO$ , the substance being generally admitted to be an oxide of a compound radical, named by Berzelius lypil, and by Löwig glycil, both of whom give it the composition  $C_3H_5$ . It is a colorless, transparent, sweet sirup, without odor, of specific gravity 1.28; it is inflammable, mixes freely with water, taking it from the air, is also soluble in alcohol, but not in ether, and dissolves salts that are soluble in water; it does not become rancid by exposure, but with yeast may be made to ferment. At a temperature above 600° F. it is decomposed, being converted into acroleine, acetic acid, and inflammable gases. Between 500° and 600° it may be distilled with only partial decomposition. Berthelot has succeeded in causing it to combine with the fatty acids, and has thus produced the organic fatty substances, stearine, margarine, oleine, &c. This was effected by keeping the mixture of acids and glycerine at a temperature of 212° for several days in close vessels. At higher heat much less time is required to complete the process.—Glycerine is a product of the process of saponification. As prepared by the pharmacutists, it was taken up with boiling water from its mixture in a free state with the plumbiferous soap,

called lead-plaster. The plaster is made by boiling together litharge (oxide of lead), olive oil, and water. The oil is decomposed by the lead taking its acids, and the glycerine is thus liberated. When hot water is added in equal quantity to the plaster, the mixture is well stirred, and the liquid part is decanted; any lead that may be present is thrown down by a current of sulphuretted hydrogen, and is got rid of by filtering. The water is finally removed by evaporation at a temperature below 212°, leaving the glycerine. Various other methods of preparing it are however in use. The mother liquor of the soap factories affords a convenient source of it. From these it is separated by first adding a slight excess of sulphuric acid, heating the solution with carbonate of baryta, filtering, and, after the filtrate has been concentrated by evaporation, taking up the glycerine with alcohol, which is afterward to be distilled off. A hot solution of fat has been decomposed by injecting into it superheated steam. The fatty acids and glycerine, collected in a receiver, separate in two layers, the glycerine at bottom. The acids can be drawn off, so as to leave the glycerine with no other mixture than water. The method of detecting the presence of glycerine when in small quantity is based on the marked qualities of the substance acroleine into which it is in part converted by heat. If the substance supposed to contain it be separated from foreign mixture as far as possible and rapidly heated, either alone or with a little anhydrous phosphoric acid, the acroleine generated, in case glycerine was present, will be detected by the pungent acrid odor, somewhat like that from the wick of a candle just extinguished.—Glycerine has been esteemed of little importance until within a few years. It first came into use in medicine, being introduced into the ear when this was deficient in the secretion of wax. Its property of long continuing moist, while it is not of a greasy nature, suggested its application in certain diseases of the skin characterized by dryness and hardness; this was attended with satisfactory results. It is said to act upon urinary calculi, for which it is now prescribed. Poultices are long kept soft by the addition of  $\frac{1}{4}$  to  $\frac{1}{2}$  of this substance; and it is made a vehicle for administering other medicines, whose properties are disguised by dissolving them in it as in water. For use in cosmetics and perfumery it is now largely manufactured, its soft, agreeable qualities, without greasiness or liability to putrefy, rendering it an excellent ingredient in soaps for the toilet, pomade, hair tonics, &c. It is lately employed in the photographic art, and its use is extending for a variety of new purposes. A glycerine ointment of much repute for chapped hands and excoriations is made as follows:  $\frac{1}{2}$  oz. of spermaceti is melted together with a drachm of white wax and 2 fluid oz. of oil of almonds, by a moderate heat; the mixture is poured into a Wedgwood mortar, when a fluid ounce of glycerine is added to it and rubbed till the ingredients are thoroughly mixed and cold.

GLYNN, a S. E. co. of Ga., bordering on the Atlantic, and bounded N. by the Altamaha river; area, about 400 sq. m.; pop. in 1850, 4,933, of whom 4,232 were slaves. The state census of 1855 exhibits no returns from this county. The surface is level and occupied partly by sandy pine barrens, partly by vast swamps, which when drained are productive. The sea island cotton grows here in perfection. Several islands on the coast, one of which is about 12 m. long, are included in the county. The productions in 1850 were 49,739 bushels of Indian corn, 55,100 of sweet potatoes, 3,829,375 lbs. of rice, and 1,036 bales of cotton. There were 4 tar and turpentine distilleries, 2 ship yards, 1 saw mill, 6 churches, and 176 pupils attending schools and academies. This county is one of the oldest in the state, having been formed in 1777, and named in honor of John Glynn, an English lawyer noted for his friendship toward the American colonies. Capital, Brunswick. Value of real estate in 1856, \$867,860.

GLYPTODON, a gigantic fossil mammal, belonging to the edentate order with the *megatherium* and *mylodon*, but to the family *dasyptida* or armadillos, found in the tertiary deposits of the pampas of South America, and especially in the neighborhood of Buenos Ayres. This animal, with the fossil genera above mentioned, establishes the transition between the sloths and the armadillos, and also indicates some pachyderm affinities. Very full descriptions of the species of glyptodon have been given by Prof. Owen in the "Transactions of the Geological Society of London," vol. vi., and in the "Journal" of the same society, vol. i. He describes 4 species, of which the largest is the *G. clavipes* (Owen); this species, in the structure of the foot and the articulation of the lower jaw, approaches the pachyderms; it resembles the megatherioids in the strong descending process of the zygomatic arch, compressed from before backward; the cranium was protected by dermal plates, and its well developed ridges indicate the existence of very powerful muscles. The teeth, 8 on each side of each jaw, have a large proportion of hard dentine, and are characterized by 2 lateral sculptured grooves, whose wide and deep channels divide the grinding surface into 8 portions; hence the generic name applied by Owen, which means "sculptured tooth." The back and sides were covered by a carapace composed of thick polygonal bony plates, united by sutures, smooth on the inside, rough and sculptured externally, to the number of more than 2,000. The length of the largest living armadillo, covered with a flattened shield, is about 8 feet; the size of the glyptodon may be imagined from the measurement of its carapace in the museum of the royal college of surgeons: the length, following the curve of the back, is 5 feet 7 inches—in a straight line, or the chord of the arc, 4½ feet; the breadth, following the curve, is 7½ feet—in a straight line, 8½ feet. The tail measured 1½ feet in length, and 14 inches in circumference at the circular base; it was slightly depressed toward

the apex, and gently curved, with the concavity upward; the caudal vertebrae were enclosed in an inflexible sheath of bony plates, terminated by 2 ossicles, like a bivalve shell, enabling it to pierce the soil if necessary. The feet were short and stout, armed with depressed nails. The glyptodon, in its firm, convex carapace, scale-covered tail and head, short limbs, and consequent slow motions, presents many external analogies to chelonian reptiles, and in its size and shape must have resembled rather the living Galapagos tortoise than the great armadillo. Like the living armadillo, the extinct glyptodon was confined to the warm parts of South America. Other species described by Owen are *G. ornatus*, *G. reticulatus*, and *G. tuberculatus*, all obtained from the vicinity of Buenos Ayres.

GMELIN. I. JOHANN GEORG, a German naturalist and traveller, born in Tübingen, June 12, 1709, died there, May 20, 1755. In 1781 he became professor of chemistry and natural history at St. Petersburg, and in 1738 started on a scientific journey through Siberia, with a number of distinguished companions, at the expense of the government. He traversed Siberia in every direction, and returned to St. Petersburg after an absence of nearly 10 years. In 1749 he accepted the professorship of botany and chemistry in his native city, which office he held till his death. His *Flora Sibirica* (4 vols., St. Petersburg, 1749-'70), and his "Journey through Siberia" (4 vols., Göttingen, 1751-'2), are his principal works. II. SAMUEL GOTTLIEB, nephew of the preceding, born in Tübingen in 1744, was appointed professor at the academy of St. Petersburg, travelled through southern Russia, and died at Akhmetkent, in the Caucasus, in 1774. His "Journey through Russia," a scientific work, is his chief publication. III. JOHANN FRIEDRICH, nephew of Johann Georg, born in Tübingen in 1748, travelled through Germany, Holland, and Belgium, and was appointed professor of chemistry and medicine at Göttingen, where he died in 1804. He wrote voluminously on the natural sciences, but he is chiefly known as editor of the 18th edition of Linnæus's *Systema Naturæ*.

GNAT, a name commonly given to the family *culicida*, of the proboscidean division of the order *diptera* or 2-winged insects—the *cousin* of the French, the mosquito of the United States. The gnats belong to the genus *culex* (Linn.), which is characterized by a soft, elongated body; long legs; large head and eyes; long, many-jointed antennæ, most plumose in the males; filiform and hairy palpi, longest in the males; a sucking proboscis, formed of a membranous sheath enclosing from 2 to 6 sharp bristles or lancets, which take the place of jaws, and whose punctures, therefore, are properly called bites; the side pieces of this apparatus serve not only as suction tubes, but as supporters and protectors of the lancets; wings horizontal, delicate, and many-veined; the winglets, 2 little scales behind the wings, and moving with them, are small; behind these are the knobbed balancers

or poisers. The old genus *Culex* was divided by Meigen into 3, and was by him restricted to such gnats as have the palpi in the males longer than the proboscis, and very short in the females; the other 2 were *Anopheles* (Meigen), in which the palpi of the males are as long as the proboscis, and *Aedes* (Hoffmannsegg), in which they are very short in both sexes; to these were afterward added *Sabethes*, with palpi shorter than proboscis; *Megarrhinus*, with very long recurved proboscis and short palpi; and *Pseorophora*, with a small appendage on each side of the prothorax. Other genera, ill-characterized for the most part, have been added by modern systematists; but the whole family is very little understood. The names gnat and mosquito are also given in some places to members of the family *Tipulidae*; and our own mosquitoes belong to several genera, among which is the genus *Culex*, properly confined to the more northern regions of the continent. No attempt will be here made to introduce order into the mosquito chaos; but the common gnat (*C. pipiens*, Linn.) will be taken to illustrate the curious metamorphoses and habits of this bloodthirsty family. Dr. Harris mentions 5 species of *Culex* and one of *Anopheles* as found in New England; to these many species and several genera must be added, when we consider the vast extent of this country. Some species are active by day, others only by night, but both are equally fond of human blood; the former are found principally in marshes and damp woods, and rarely in houses, and are of more brilliant colors than the nocturnal species. The males with plumed antennæ do not annoy us by their bites, but simply flit from flower to flower, sipping the dew and sweet juices, requiring but little if any food, propagating their species, and soon after perishing. Every one's experience proves that the female gnats are most persistent biters and annoying musicians, at almost all seasons of the year; from the tropics to Lapland and arctic America, man is obliged to adopt some contrivance to protect himself from their attacks—either the thick coat of grease of the northern regions, the sand bed of the tropics, the smoky smudge of the woods, or the mosquito bars and curtains of civilized life. Gnats have been known to appear in such swarms as to constitute an insect plague, darkening the air like clouds of smoke, arresting the progress of invading armies, and rendering whole districts for the time uninhabitable; attacking not only man but beasts, and, even when not biting, filling every crack and corner with their countless multitudes. When we consider the immense number of these insects, and the comparatively small proportion which can ever taste human blood, we must admit, what experiments with sweetened fluids have confirmed, that vegetable juices form the food of the greater number of females, and perhaps the natural food of all; many males probably do not eat at all. The sucking apparatus is admirably contrived for obtaining fluids, animal or vege-

table, and these insects are provided with a sucking stomach independent of the proper digestive cavity. The sucker in all its essential parts has been well described and figured by Réaumur in his "Memoirs;" the flexible sheath gives support to the lancets while they penetrate the skin; the point of the combined lancets is sharper than the finest needle, so that the size of each of the several weapons must be very small; the wounds made by this instrument would be insignificant, were it not for an irritating secretion from the proboscis, which in some delicate skins produces obstinate itching, considerable redness and swelling, and, in rare instances, even irritable ulcers.—The metamorphoses which gnats and mosquitoes undergo are very curious, and especially interesting for the ease with which they may be seen. The eggs are deposited in almost any natural or artificial receptacle for water, and are arranged in a boat-shaped form; fixing herself by the 4 anterior legs to some object at the surface of the water, the female crosses her hind legs in the form of the letter X; bringing the latter close to the end of the body, on a level with the water, the first egg is received and retained in place by the crossed legs; as the eggs are extruded they are placed side by side vertically, adhering firmly together by the glutinous substance which covers them; when the stern of the egg raft is properly raised, it is pushed further from the body by the succeeding ova, always retained in place by the legs on the sides; when the raft is about half made and its shape is determined, the legs are uncrossed and placed parallel, and the prow of the boat is narrowed and raised like the stern. The boat is always of the same shape, containing from 250 to 350 eggs, and is abandoned by the mother to the mercy of the winds and waves, which can neither sink, wet, nor break it up; even a temperature below freezing cannot destroy the life within these eggs. The larvæ come out in a few days from the lower end of the eggs, which are arranged somewhat like the seeds of the ripe sunflower, and the empty shell boat is soon destroyed by the weather. The larvæ of gnats and mosquitoes are the well-known "wigglers" seen in warm weather in almost every collection of standing water; they remain, as it were, suspended from the surface of the water, head downward, breathing air by means of a respiratory tube which goes off at an angle from near the end of the body, communicating with the tracheæ; the tube and the terminal joint are provided with radiating hairs; the head is round, distinct, with antennæ and ciliated organs which keep up a constant current of water toward the mouth, and bring within their reach the minute animalculæ on which they feed; the thorax and 10-jointed abdomen are furnished with lateral pencils of hairs. If disturbed, these larvæ quickly wriggle to the bottom, but soon come again to the surface and suspend themselves by the respiratory tube. Some species are comparatively free from hairs in

this condition. After remaining in the larva state from 5 to 15 days, according to the weather, and changing their skins 2 or 3 times, they are changed into pupæ, called tumblers from the manner in which they roll over and over in the water by means of the fin-like paddles at the end of the tail; they are very quick in their motions, and swim with the head upward; the respiratory openings are at the end of 2 tubes situated just behind the head, so that the little tumblers remain near the surface, head upward, to take in air; in this state, which lasts 5 or 10 days, according to circumstances, the insect takes no food; the future gnat can be distinguished through the transparent covering of the pupa. When the perfect insect is ready to come forth, the pupa skin bursts open on the back toward noon on a warm, still, sunny day, and the head of the gnat makes its appearance, followed soon by the thorax; this is a process of great danger to the insect, as the slightest breeze would tip over the emerging form, and consign it to certain death in the water; after it has succeeded in raising its body except the tail, and stands erect like a mast in the pupa shell boat, it extricates the front pair of legs and places them for support on the surface of the water; the heavy and wet wings are now slowly unfolded, that the sun and air may dry them; this effected, the danger is over, and the other legs are drawn forth and extended on the edge of the pupa case, the body is stretched out, the antennæ and proboscis elevated; by this time the wings are dry and fully expanded, and the insect flies off to revel among the flowers or in search of blood, according to the sex. The source of the buzzing noise, which to many is more annoying than their bite, has been much discussed by naturalists, and is still the subject of dispute; it has been ascribed to the mouth by Mouffet, to the friction of the base of the wings against the chest by Kirby; the winglets, the poisers, the motion of the wings, the rapid passage of air through the thoracic stigmata, and the vibrations of the thorax from the contraction of the muscles of the wings, have been supposed to be the cause by other entomologists; by whatever organ it be produced, Siebold says it is always due to the action of voluntary muscles, and has no connection with the respiratory system. It is probable that the sound is produced by the combined action of the wings and by the thoracic vibrations consequent thereon. It has been estimated by Baron de la Tour that the gnat vibrates its wings 50 times in a second. This very rapid movement probably depends on a peculiar form of muscle which has been detected in the mosquito and other *diptera*; the fibrillæ are not bound together as in ordinary striated muscles, but are separate and parallel, formed by the aggregation in a linear series of little disks with regular interspaces; contraction of these independent fibrillæ takes place by the approximation of these disks to each other; some are contracting while others are relaxed, so

that a constant and rapid movement of the wings is secured. It is certainly a remarkable example of the extent of modern microscopic investigation, that the minute muscles of the wings and legs of the mosquito can be dissected and studied. All the biting *culicidæ* do not make a boat of eggs; some string their ova end to end, others deposit them in soft mud or in dry sand; but all require moisture in the larval state. As the eggs are developed into the perfect insects in about 8 weeks, many broods are hatched in the course of the warm season, fully explaining their occurrence in large numbers; fortunately only a small portion of the pupæ succeed in extricating themselves from their cases; thousands of them perish by drowning, and are devoured by fish, reptiles, and aquatic insects; the perfect gnats supply food for carnivorous insects, the great tribe of fly-catching birds, and the bats.—The family of *tipulidæ* are also called gnats; these are often seen performing their aerial dances during the summer, and in sheltered places even in mild days in winter, preferring the decline of day; these dancing companies are said always to consist exclusively of males; any attempt to intrude upon their sportive circles shows their quickness of vision and of motion, as the whole company is at once removed to a distance. These gnats are sometimes produced in such numbers as to prove exceedingly annoying; they crowd into houses, fly into articles of food, extinguish candles, and fill up every opening, even the human mouth, nose, and ears, forming one of the most common insect plagues.

GNEISENAU, August, count, a Prussian general, born in Schilda, Oct. 28, 1760, died in Posen, Aug. 24, 1831. He first took service in the Austrian army, and subsequently in that of the prince of Anspach Baireuth, with a detachment of whose troops he was sent to America to serve under the English, shortly before the close of the war of American independence. He returned after the peace, and entered the Prussian army, where he was made captain in 1789. In 1794 he fought against the Poles, and after the disastrous battle of Saalfeld in 1806, and the reverses which followed it, he organized a battalion of reserves, was appointed commander of the fortress of Colberg (1807), repelled the assaults of the French, and held the place till the peace of Tilsit. The resentment of Napoleon caused his removal from the army (1809), but he received several secret missions to Vienna, St. Petersburg, Stockholm, and London. Afterward he was attached to Blücher's army as quartermaster-general, and subsequently as chief of the staff. (See BLÜCHER.) He took a leading part in the eventful Silesian campaign of 1812, and after the battle of Leipsic he was made lieutenant-general. He was also zealous in the organization of the patriotic *Tugendbund*. His activity was no less important during the campaign of 1814 in France, both on the battle field and in the council of commanders. He is said to have advised the march to Paris, which

overthrew the first empire. The title of count, the rank of general, and an estate yielding an annual income of 10,000 thalers, were his reward after the peace. After the return of Napoleon from Elba he again served with Blücher, and effected, while the old commander was disabled, a skilful retreat from the battle field of Ligny (June 16), thus enabling the Prussians to reappear at Waterloo (on the 18th), and to decide the fate of the campaign. He now took part in the negotiations for peace, was made commander of the Rhenish corps, and accompanied Blücher to England. Disappointed in his expectation of constitutional liberty, as promised by the princes of Germany during the war, he tendered his resignation, which was conditionally accepted. In 1818 he was appointed governor of Berlin and member of the state council, and in 1825 he received the rank of field marshal. When the revolution of Poland seemed to take a threatening aspect in 1831, he received the command of the army in the eastern part of Prussia, soon after which he died of the cholera.

GNEISS, one of the metamorphic rocks, of the same composition with granite, from which it differs in presenting the 8 ingredients, quartz, mica, and feldspar, in tolerably distinct layers. The whole mass is often divided into distinct beds or strata, and these exhibit a tendency to cleave along the planes in which the mica is most largely distributed. Gneiss by gradual change of structure becomes granular, and then cannot be distinguished from granite. By increased proportion of mica and loss of feldspar, it passes into micaceous slate. The name gneiss is sometimes given to the group of metamorphic rocks, including the micaceous and hornblende slates, quartz rocks, &c. They are also called hypozoic in reference to their position beneath the fossiliferous strata. The series is familiarly known in the eastern and middle states, ranging through Vermont, Massachusetts, the S. E. part of New York, through northern New Jersey, eastern Pennsylvania, Maryland and Virginia, &c. The gold region lies in this group.

GNESEN (Pol. *Gniezno*), a town of Prussia, in the duchy of Posen, the seat of an archbishop; pop. about 7,500. It was the capital of Poland from the foundation of that state till 1320, when Cracow became the capital. The archbishops of Gnesen were the primates of the state, and officiated as vicars during the often long disputed elections of the kings. Gnesen was often besieged, taken, and pillaged.

GNIEDITCH, NICOLAI, a Russian poet, born in Pultowa in 1784, died in St. Petersburg, Feb. 1838. He devoted 18 years to the translation of the Iliad into Russian, and furnished beside translations from the writings of Anacreon, Voltaire, Byron, and of other authors. The most celebrated of his original poetry is an idyl, *Ribaki*, or "The Fishermen."

GNOME. See PROVERB.

GNOMES, in the fanciful systems of demonology, one of the 4 classes of elementary spirits, composed of the subtlest parts of the earth, as

the salamanders were of fire, the sylphs of air, and the undines of water. The earth, it is said, is filled to its centre with gnomes of aight stature, both male and female (the latter are called gnomides), and both mischievous and beneficent, who guard its mines, precious stones, and all its treasures. They were believed to furnish to alchemists and cabalists all the gold and silver needful to them. They nearly correspond, in learned and scientific treatises, to the dwarfs and kobolds of popular tradition.

GNOSTIOS (Gr. *γνῶσις*, knowledge), a body in the early Christian church, reckoned by most writers among the heretical sects. Locally, most of the Gnostics belonged to the Egyptian and eastern churches, and their opinions had comparatively little influence on the churches of Italy and the West. They were most numerous in Asia Minor and Syria. Yet Hippolytus, in the *Philosophoumena* generally attributed to him, assigns to many of their speculations a Grecian origin, insisting that not the opinions of Plato only, but of Aristotle, Pythagoras, Heraclitus, and Empedocles, appear in the theories of the principal Gnostic teachers. According to most authorities the Gnostic heresy began to show itself even in the time of the apostles. Simon Magus pretended that he was an emanation of God; and several passages of the epistles of Paul, and of the epistles ascribed to Peter, John, and Jude, seem to be suggested by Gnostic views. The testimony of the Apocalyptic writer is still more decided. A legend of the church tells us how St. John turned his back upon Cerinthus, whom he met in the bath at Ephesus, and a current tradition affirms that John wrote his Gospel to confute this heretic. The fathers, however, are divided as to the character of the heresy of Cerinthus. While many pronounce him a Gnostic, some will have it that he is a Chiliasist. The flourishing period of Gnosticism was the 2d Christian century. In the 3d century it was to a considerable degree supplanted by other heresies, especially by the kindred heresy of Manicheism. Some of its schools were nearly extinct in the 4th century, and in the 6th century the Gnostics are no longer spoken of as a sect, although traces of their opinions are still to be found.—There are 3 principal theories of the character of Gnosticism. Banr treats it as a "philosophy of religion," resulting from the comparison of various religious systems. Neander treats it as a fusion of Christian ideas with oriental theosophy, caused by the prevalence of sensuous ideas within the church. Möhler would have it to be an intense and exaggerated Christian zeal, seeking some practical solution of the problems of sin and evil. All minor theories of the purpose and motives of Gnosticism can be comprehended in one of these; and these 3 would agree in the general definition, that Gnosticism is an attempt to solve the great problems of all theology by combining the elements of pagan mysticism with the Jewish and Christian traditions. It is impossible to make

a quite accurate definition of a system of which the speculations are so vague, and the materials for judgment so scattered and fragmentary. There is no evidence at any time of unity either of opinion or action in the Gnostic party. Different writers vary widely in their method of classifying the various Gnostic schools. Some classify them by opinions, some by origin, and some by locality. Neander makes the force of opposition to Judaism the test of his discrimination among the Gnostics. Gieseler divides them into 2 classes, those who are dualists, and those who are emanationists. Matter, the French historian of Gnosticism, reckons 4 classes, the Gnostics of Syria, of Asia Minor, of Egypt, and of the rest of the Roman world. Hase numbers 3 classes, Hellenistic, Syrian, and Christian Gnostics. Baur divides the sects into Valentinians, who prefer paganism, Marcionites, who prefer Christianity, and the pseudo-Clementine party, who prefer Judaism, in their theosophic discussions. And still another ethical division, suggested by Schaff, gives the 3 classes of "speculative and theosophic," "practical and ascetic," and "antinomian or libertine." With such wide differences of classification, it is difficult to discover the essential teachings of Gnosticism, or to combine the shades of doctrine of the different schools. The general characteristics of all the classes cannot be gathered into exact statements. All Gnostics are not dualistic, nor do all hold the Docetic heresy.—The average doctrines of the Gnostic sect, as they are set forth in the writings of their opponents, are as follows: 1. Concerning God. The Gnostics remove God infinitely far from the world, enclose him in the "Abyss" (*Bador*), with which indeed he is confounded, separate him from every work of temporal creation, and leave him uncomprehended and incomprehensible by any mortal. He only communicates with the lower world through the medium of the *æons*, which he sends forth from his grand solitude. The Gnostic God has infinite development in the forces which he sends, but no personal or special providence. He is the sum of being, yet the extreme of abstraction, and is even called the Not Being (*οὐκ ὂν*). 2. The Pleroma. Below the abyss, in which God alone dwells, or surrounding this abyss, is the Pleroma, or fullness, that world of light and glory which the *æons* inhabit. These *æons* are emanations from God's central fullness, are embodiments of his divine attributes, and fulfil the functions denoted by their several names. They are called *æons* because they are the representatives of the Eternal. Only the first of these *æons*, Nous, or Mind, proceeds directly from the bosom of Deity. The other spirits of the Pleroma emanate in descending succession from the first *æon*. Reason, Wisdom, Power, Truth, Life, are the names of the higher. These *æons* are variously numbered and classed. According to Valentinus, they are of different sexes and go in pairs. Another writer reckons the number of super-

rior *æons* at 365. Only the lowest *æon* has any communication with the material world, and he is at the point where the two worlds touch each other. The business of the *æons* is to people and to care for the spiritual world. To show the reasonableness of this emanation theory, Saturninus uses the illustration of numbers developed from an original unit, while one of the three known by the name of Marcus compares the emanation of *æons* from God to the tones of the voice lessening steadily to a faint echo. 3. The Demiurge. The Gnostics regarded matter as infinitely separated from God, and the material world as the antithesis of the spiritual world. Hyle, or matter, is either absolute deadness and emptiness (*κενωμενα*), or is a positively evil substance. The creator of this material universe is the Demiurge. He is himself a creature of the lowest of the *æons*, Achamoth. He not only creates and rules the terrestrial world, but has equal sovereignty over the planets and stars. He fulfils unconsciously, according to some, and according to others defiantly usurps, the functions of the infinite God. He appears in Jewish history as Jehovah. Other names by which he is known are those of Arohon and Jaldabaoth, the son of chaos. The immediate work of the Demiurge is evil, and it takes the world of man and matter further away from God and the world of light. 4. Human nature. Man, according to the Gnostics, has a threefold nature, of spirit, of body, and of soul. His soul nature stands between the other two, and forms their connecting bond. They divided men into 3 classes, according to the predominance of one or other of these 3 natures. The highest or spiritual class were the Pneumatici; the lowest or carnal class were the Sarkici, or Physici, or Hylci; the intermediate class were the Psychici. The first of these classes were privileged to enjoy a light from the world of *æons*; the second were left wholly to material and hylc influences; while the third were under the direction and influence of the Demiurge, who could save them from utter debasement, but was not able to give them spiritual life. Historically, the Christians constituted the Pneumatici, the pagan world the Physici or carnal class, and the Jews occupied the intermediate place. But in dividing the Christians of their own time, the Gnostics numbered two classes, the select few of their own number who were admitted to the divine secrets, and the large body of common believers, who were not able to rise above the psychical condition. Some of them maintained that though man as connected with matter is by nature sinful, and though the Demiurge had wished to create man in his own image, yet unconsciously he reproduced in this work of his breath, not his own image, but a shadow of that divine original which moved before his imagination. Man is better than the intention of his creator. 5. Redemption. The subjects of redemption, according to the Gnostics, are only the pneumatic and psychic classes; the carnal or hylc class



are destined to annihilation when their material life shall close, and with them such of the psychic class as have not accepted the influence from the Pleroma. The instrument of redemption is the *æon* Christ. This *æon* comes down from the spirit world, assumes bodily shape without being actually united to any material body, and walks among men in Judaea as Jesus of Nazareth, not a real human person, but an optical illusion, the phantasm of a spiritual idea. Some of the Gnostics were willing, indeed, to speak of the human life of Christ; but all denied that his body was like that of other men, composed of the elements of corrupt and sinful matter. Christ's body was an ethereal body of more delicate fabric than the common human body. Hunger would not impel him to eat, nor thirst to drink. Yet this fine ethereal body was too gross for the Pleroma, and was left in the sun at Christ's ascension. The advent of Christ upon the earth was not the birth of a prophet, or the coming merely of a promised Messiah, but a spiritual apparition to overthrow the work of the evil spirit—"an incarnation of the spirit of the sun." The presence of Christ anywhere made men conscious of this divine nature. They might doubt of the humanity of Christ, but not of his divinity. The process of redemption, in the Gnostic theory, is the communication through the *æon* Christ of a divine life to the world of man, the revelation of that life through this mediator. Christ redeems the world as he draws the spiritual in the world toward the heaven of God. His sufferings and death have no influence in the redeeming work, since, in the first place, they were illusory, and in the second place, sufferings do not redeem, but only punish. The manifestation by his acts and words of the spirit of God made Christ the redeemer. Some expressions were found in Gnostic writings which might be interpreted as teaching views of redemption more in harmony with the church creeds; but nowhere in their writings was any doctrine of atonement stated, or any stress laid upon the crucifixion as its central point. Marcion extends the redemption into the world of Hades, and maintains that Christ descended into hell to lead back the virtuous and believing heathen to share salvation with the spiritual Christians; but his view in this article of faith was not universally adopted. In regard to the means of profiting by the redemption of Christ, the Gnostic teachers were not agreed. Marcion taught a doctrine resembling that of Paul, making faith the means of justification and the ground of reconciliation. But most of the sect held that only "gnosis," the rare superior intelligence and comprehension of divine truth, could enable men to receive the gift of Christ. This spiritual science was the evidence of salvation to believers. The actual manner of union between Christ and his redeemed ones was very vaguely described in the Gnostic writings. They are hampered continually by their Docetic notions of the nature of Christ, and their language in speaking of re-

demption and its issues is confused. 6. The church. It was charged against the Gnostics by the Alexandrine Clement, "that they boasted of superintending schools rather than churches." Yet they held to a church, which should have a twofold life, for the mass of believers, and for the initiated; for those, common exoteric doctrines, and for these, spiritual esoteric doctrines. Like the Druses of modern Syria, the Gnostics recognized a sacred secret society within the proper circle of the church. Practically they had little talent for organization, and many of them were content to theorize about spiritual truth, while submitting to the recognized ecclesiastical order. Baptism was to them the important rite, since Jesus became Christ at his baptism, and through this rite the higher spirit was imparted to the sensuous soul. It was the sign of their emancipation from demiurgic rule. A few spiritual puritans objected to baptism as too physical a rite, but most of the Gnostics celebrated it with great show and solemnity. The Lord's supper was to them of less importance, being only the sign of a material feast, on the reality of which their views of the nature of Christ threw doubt. Some of them kept the feast days of the church, and the followers of Carpocrates allowed the use of images both of Jesus and the saints. While the idea of the church was to a great extent discarded, much of its ritual and its splendor was retained. 7. Practical morality. Two tendencies in practical morals are to be observed in the Gnostic schools. On one side is the ascetic tendency, which seeks a complete emancipation from matter and from bodily passion, as the seat of sin; on the other side the licentious tendency, which plunges into all sorts of excess, on the plea that sensual passion is most surely overcome by satiety, and that much fleshly indulgence will best vindicate the supremacy of the spirit. Many of the charges, however, brought against this latter class of Gnostics are to be taken with large abatement; and the assertion of Epiphanius that the Gnostic sects revived in Egypt the old Phallic worship is to be received with caution, as one of the many scandals of that credulous writer. There is no evidence that the average morality of the Gnostics was below that of the orthodox Christians, or that the ascetic tendency was carried to such extremes among them as among the Jewish Essenes or the later Christian hermits. Gnosticism, in the 2d century at least, was rather a speculative than a practical heresy, a system of intellectual vagaries rather than of moral corruptions.—In speaking of the principal Gnostic teachers, the geographical division may be adopted as most convenient, if not most philosophical. Of the precursors of Gnosticism before the formation of its principal schools are mentioned Euphrates, a half-fabulous person, only known by allusions in 2 or 3 passages of Origen's writings; Simon Magus, whose authentic history is related in the Acts, but of whom legends abound; Menander, the leading

successor in Simon's school, who asserts that his disciples enjoy an immediate earthly immortality, that they never die and never grow old; Cerinthus, who was a believer in the millennium, and in the human birth of Christ; Nicolaus, of whom nothing certain is known, except that he founded the sect of Nicolaitans, noted for their lax and reckless morality. Of the Syrian school, the chief characteristic of which is dualism, the principal teachers are: 1. Saturninus, who lived at Antioch about A. D. 125, in the reign of Hadrian. He maintains that the lowest æon is formed from the spirits of the 7 planets; that the evil spirit formed a race of hylic men to counteract the race of psychic men formed by this æon; and that Christ is the æon Nous in a visible but not corporeal body. His school, never very numerous, was confined to the neighborhood of Antioch, and was hardly known in the succeeding century. It was characterized by intelligent and clear expositions of Scripture, and by rigor of life, avoiding marriage and animal food. In this school the Christian element was more conspicuous than the Jewish or the pagan. 2. Bardesanes, who flourished about A. D. 161, in the city of Edessa, where he was the trusted friend of King Abgar. He was a scholar of large attainments, versed in the literature of Greece, Chaldea, Persia, and India, the author of hymns which remained in favor with the eastern church for many centuries, unblemished in character, and inflexible in his hostility to paganism, as was proved by his controversy with the sophist Apollonius. His system is one of Christian allegory and poetic mysticism, dividing heaven and the Pleroma by "syzygies," maintaining the free will of the moral man, and giving the Holy Spirit to Christ, as at once sister and wife. His successors in the school were his son Harmodius, also a hymnist, and Marinus, one of his most learned and sagacious disciples. This latter taught a system of fatalism. The followers of Bardesanes received the books of the sacred canon, were always desirous to be reckoned orthodox, and were pure in life in spite of the demoralizing tendency of some of their views. The school was widely extended through Syria, and lasted until the 5th century. 3. Tatian, who is by many reckoned with the Syrian school, though he was a rhetorical teacher in Rome. He was converted by Justin Martyr. His theories were dualistic. One of his books, the *Oratio ad Græcos*, written in Greek, remains. He was the reputed founder of the sect of Encratites, which flourished in the 3d century. —In the Egyptian school, characterized by the emanation theory, the principal teachers are: 1. Basilides of Alexandria (125–140). The chief peculiarities of his system are its use of mystic numbers and names—the "ogdoad" or upper heaven, the "hebdomad" or lower heaven, the "alvaxas," or series of 365 circles of creation—its two demiurgi, and its threefold Christ. It made more account of faith than other Gnostic systems. The school of Basilides accepted also parts of the sacred writings, adding to them

various apocryphal books. It was large in numbers, respectable in influence, but not remarkable for Christian zeal or for excellence of life. After Basilides its most distinguished leader was Isidorus, his son, who made a system of ethics. 2. Valentinus, an Alexandrian Jew, who taught in Rome about the middle of the 2d century, and died in Cyprus in the year 160. His system of æons is divided into 8 series of 15 pairs, an ogdoad, a decad, and a dodecad. They are male and female. His "threefold Christ" differs from that of Basilides. His elaboration of Gnostic ideas was more complete and ingenious than that of any other writer, and his influence was longer and wider in its extent. Matter numbers 7 distinguished names among the successors of Valentinus, 5 of whom founded schools; these are Secundus, Ptolemy, Marcus, Colarbasus, Heracleon, Theodotus, and Alexander. 3. The Ophites, a powerful sect, yet without any distinguished name among their teachers. They pretended to be earlier than the time of Christ, and they existed at a later period than the other Gnostic sects. As their name implies, the serpent was for them a sacred emblem. They regarded the fall of man as a progress rather than as a loss, named the Jewish Jehovah "Jaldabaoth," or the God of chaos, preferred Judas to the other disciples, affirming that he betrayed Christ to destroy the kingdom of God's enemy, and denied that the real Christ was ever crucified. The Sethites and Cainites were branches of this sect. The moral character of the Ophites was bad, and the sect came, not only under the constant rebuke of the church teachers, but under the imperial ban.—Of the Gnostics of Asia Minor, the one eminent name is that of Marcion, an austere moralist, and a vigorous reasoner. He taught at Rome about the middle of the 2d century. His system is characterized by the constant antithesis between Christianity and Judaism, by a scornful rejection of the Old Testament, and of all apostolic authority except that of Paul, and by a rigid asceticism. His followers were numerous even to the time of Mohammed. Marcus, Lucan, and Apelles were prominent among them. Of the Gnostics not localized, but mostly related by their doctrines to the Gnostics of Egypt, may be mentioned the schools of Carpocrates and Epiphaneus, the Antitactas, the Bortonians, the Phibionites, the Arochontes, the Adamites, and the Prodicians. Hermogenes of Carthage is also by some regarded as a Gnostic teacher.—While the particular sects and schools of the Gnostics had disappeared almost wholly in the 6th century, their opinions survived to a much later age, seriously affecting not only the orthodox faith, but appearing in many of the famous and troublesome heresies. Their earlier influence is to be noticed in the views of the Ebionites and the Docetæ, in the speculations of the Clementine Homilies, in the radical theories of Montanism, in the fantasies of the New Platonists, and above all in the powerful and wide-spread Manichean heresy. Some have also endeavored to find traces of Gnosticism in

the Sabellian, Arian, and Pelagian heresies. In the 7th century their doctrines were repeated by the Paulicians, in the 9th by the Athingians, or "children of the sun," in the 11th by the Cathari, and in the 12th by the Bogomiles of Byzantium. Some of the opinions of the knights templars and of the Waldenses seemed to be borrowed from this source, and the reveries of Spanish and German mystics are not unlike the hymns of Bardesanes.—The most important works which treat of Gnosticism are: Neander, *Genetische Entwicklung der vornehmsten gnostischen Systeme* (Berlin, 1818); E. A. Lewald, *De Doctrina Gnostica* (Heidelberg, 1818); Möhler, *Ureprung der Gnosticism* (Tübingen, 1831); Baur, *Die Christliche Gnosis oder Religionsphilosophie in ihrer geschichtlichen Entwicklung* (Tübingen, 1885); Matter, *Histoire critique du gnosticisme* (2d ed. 3 vols., Paris, 1843-'4); Jacobi, article in Herzog's *Real-Encyclopädie* (Stuttgart, 1856); and the church histories of Mosheim, Neander, Gieseler, Hase, and Schaff. Beausobre's "History of Manichæism," Münter's "Ecclesiastical Antiquities," Ritter's "History of Philosophy," Dorner's "Christology," and Bunsen's "Hippolytus and his Age," as well as the numerous German histories of dogma, contain acute criticisms of Gnostic opinions.

GNU, a hollow-horned ruminating animal, inhabiting the plains of southern and central Africa, generally classed with the *bovidæ* or ox family, of the genus *catoblepas* (H. Smith); the *wilde beest* of the Dutch colonists at the Cape. This is one of the most singular of animals, having the head and horns of a buffalo, the body and mane of a horse, and the limbs of an antelope. The form of the head, neck, and shoulders is decidedly bovine, robust, and clumsy; the forehead wide and flat, the muzzle broad, and covered with hair except the valvular opening of the nostrils; the eyes large; ears long, narrow, and pointed; horns present in both sexes, above and behind the eyes, close together at their origin, descending at first downward and outward, then curving upward and backward, flattened at the base, cylindrical at the tip, rough and irregular. The hair on the brows and forehead is long and shaggy, giving a fierce expression to the face; the neck has a rigid mane above, and a long, hairy dewlap below; the shoulders are deep, and surmounted by a moderate hump; the body is rounded like that of a horse, and the limbs delicately formed; the tail is moderately long, with a brush at the end; the hair elsewhere on the body is short; the hoofs are rather large for the limbs, and the skin of the knees is bare and callous, from their habit of going on their knees in attack and defence. The general color of the common species (*G. gnu*, H. Smith) is yellowish tawny, darkest on the back and legs, with the tips of the long hair blackish. The gnu, though clumsy in appearance, is very swift and active, galloping over the plains like a horse, and feeding in large herds like wild cattle; when alarmed, it rarely

takes to flight until it has examined into the cause of the danger, a curiosity of which the hunter is able to take advantage; it is very pugnacious, and tamed with difficulty. The common species is about 3 feet 10 inches high at the shoulders, and 6½ feet long from nose to tail. A second and larger species is the *kokoon* or brindled gnu, *blauwe wilde beest* (*C. taurina et gorgon*, H. Smith), which measures about 5 feet at the shoulders, and 7½ feet from nose to tail, the tail 1½ feet, and the horns about 2 feet long. The face is blackish, the sides of the head and neck yellowish gray, the latter and the shoulders with vertical dark stripes; the body above and the sides glossy reddish gray; below, and the limbs, reddish brown. Both species inhabit the extensive grassy plains of central Africa, advancing southward after the summer rains to the Orange river, south of which only the common and first named species ranges. Great numbers are killed every year by the Cape colonists, but their annual visitations still continue; the flesh is considered excellent.

GOA, a Portuguese territory of Hindostan, in the ancient province of Bejapoor, on the W. coast, between lat. 14° 54' and 15° 45' N., long. 73° 45' and 74° 26' E.; bounded N. by the native state of Sawuntwaree, E. by the British districts of Belgaum and N. Canara, and S. W. by the Indian ocean; length 62 m., breadth 40 m.; pop. 313,262. It is well watered and fertile, producing rice, pepper, cocoanuts, betel nuts, and salt. The inhabitants, ¾ of whom are Roman Catholics, are chiefly descendants of Europeans by native women.—Old Goa, a city of the above territory, and formerly capital of the Portuguese possessions in India, is situated on an island separated from the mainland by the navigable river Mandova, 260 m. S. S. E. from Bombay; pop. about 4,000. Its houses are built of stone in the European style, its streets are regular, and its public buildings far surpass every thing else erected by Europeans in India, but are falling to decay. The inhabitants are chiefly ecclesiastics, and the aspect of the whole place is inconceivably desolate. It is the see of an archbishop, and has a diocesan seminary. During the 16th century it was one of the most flourishing European settlements in the East; its walls described a circuit of 6 m., and enclosed a population of 150,000 Christians and 50,000 Mohammedans. About that time it was ravaged by a pestilence, and this misfortune, combined with various political complications, led to its decline. St. Francis Xavier is buried there.—Nw Goa, PANJIM, or PANGAUM, situated on the same island, 5 m. nearer to the sea than the old town, on a fine bay S. of a headland called Algoada point, with 2 lighthouses, is a fortified place, and the present Portuguese capital in the East, but is ill built and declining; pop. about 20,000. It is almost deserted by the mother country, and is visited by not more than 2 or 3 Portuguese ships in a year. It has a small trade with China, with Macao and the British ports, and

with various settlements along the coast. Its harbor is scarcely inferior to that of Bombay. There are no drives, promenades, or places of amusement, and little sociality. The inhabitants are impoverished, many of the highest families supporting themselves by working lace, &c. Crime is rife among the lower classes; the police is inefficient, and no attention is paid to cleanliness. The seat of government was removed hither in 1758.—Goa was seized by Albuquerque, recovered by its native sovereign, and again taken by the Portuguese general in 1510, after a bloody assault. He improved its defences, and made it the capital of all his conquests; and except during the period between 1807 and 1815, when it was held by the British, it has ever since remained in the possession of Portugal.

GOALPARA, or N. E. Rungpook, a district of Bengal, British India, bounded N. by the native state of Bootan, E. by the district of Camroop, S. by Mymensing and the territory of the Garrow tribes, and W. by Rungpook and Cooch Bahar; area, 8,506 sq. m.; pop. 400,000. It produces cotton, tobacco, sugar, and mustard. Though belonging properly to Bengal, of which it formed a part on the acquisition of that territory by the British in 1765, it is often regarded as a district of Assam, with which country it is naturally connected by similarity of climate, soil, &c.

GOASCORAN, a town in the S. part of Honduras, Central America, on a river of the same name; pop. 500. The town is insignificant, but the river has a great importance from the facilities which it affords for interoceanic communication by means of railways between the Atlantic and Pacific oceans. It rises about 20 m. S. of the city of Comayagua, the capital of Honduras, and flows due S. into the bay of Fonseca, opposite the port and town of La Union, its total length being 80 m. Its upper waters communicate with those of the river Humuya, which flows due N. into the bay of Honduras. In conjunction with the plain of Comayagua, the valleys of these two rivers form a great transverse valley, extending from sea to sea, through which the Spaniards contemplated building a canal, and through which an English and American company is now engaged in constructing a railway. The river is navigable for small boats, but only for short distances.

GOAT (*capra*, Linn.), a well known hollow-horned ruminant, of the sub-family *ovina*, which contains the goats and sheep. The genus is characterized by a convex forehead, nose for the most part straight in its upper outline, and the absence of lachrymal sinuses and secreting glands between the hoofs; the horns, present in both sexes, but larger and more angular in the males, are of a dull yellowish brown color, compressed and nodose, with a sharp edge behind and before, curving backward, but not completing a circle, and the tips never coming forward; their curve, unlike those of the sheep, forms part of a circle whose diameter is much

longer than the head; their osseous nucleus is porous or cellular, communicating with the frontal sinuses; the chin is bearded, the tail very short and naked below, the hoofs as high on the inner as on the outer side, and the mammae, 2 in number, forming an udder; the nose is covered with hair except a narrow naked space between the nostrils; the limbs are strong, with a callosity on the carpus. The dental formula is: incisors  $\frac{2}{2}$ ; canines none; molars  $\frac{2}{2}$ ; in all 32 teeth. The hair is never very coarse, and sometimes remarkably fine, with a woolly down underneath. The time of gestation is 5 months, and the number of young generally two; the female is capable of propagating at 7 months, and the male at a year old; the age of the goat may be extended to 15 years, though they are generally old at 6. The males emit a powerful odor, especially during the love season; they are libidinous and pugnacious, rising on their hind legs and butting downward with the whole weight of the body. Fearless, capricious, gregarious, and active, they are ever in motion, ascending the most giddy heights, and springing with great precision from rock to rock where there seems hardly a possibility of their obtaining a foothold; their sight and smell are acute, their structure robust, and their habits vigilant. From the nature of their mountainous retreats, the hunting of the wild species is both difficult and dangerous; when hard pressed they have been known to turn upon the hunter, and thrust him and themselves over fearful precipices. The goats include the ibex of Europe, Asia, and Africa (see IBEX); the wild *agagrus*, the Jemlah goat or the jharal; there is no goat indigenous to America, the so called Rocky mountain goat being in reality an antelope.—The common wild goat (*C. agagrus*, Pallas) inhabits the mountains of the Caucasus, Asia Minor, and Persia, and according to some the European Alps. It is higher on the legs than the domestic goat, and the body is more slender; the limbs and neck are robust, and the horns are large in proportion to the size of the animal. The general color is grayish brown above, with a dark dorsal line and blackish tail; the colors are paler in the female, and the lower parts in this sex are sometimes whitish. They have the habits of the domestic goat, and are one of the many original stocks of the latter. Another wild species is the Jemlah goat (*C. Jemlahica*, H. Smith.) with depressed, knobby, wrinkled horns, a solid, heavy skull, and robust limbs; the hair on the neck and back is abundant, long, and loose, and on the sides of the head very coarse; the tail is very short; the color is a dirty whitish fawn, with a few brown shades and a dark stripe along the back. It inhabits the district of Jemlah, in the elevated mountain chain of central Asia. The *C. corsus* and *C. imberbis* (Blainville) are believed to be domesticated varieties of this species. The jharal of Hodgson is by Gray referred to the same species as the last, forming the genus *hemitragus* (Hodg.); they have 4 mammae.—The domestic

goat (*C. hircus*, Linn.) resembles the *C. agagrus* more than any other wild species, and was probably derived from this mixed with the various species of ibex, and if left in its original independence, without the care of man, will approximate more or less to the *agagrus* and the ibex; on the usually recognized principle that the varieties most resembling the wild goats are nearest their original types, we find some of the breeds very far removed from and others very near to the above described species. The common goat of the mountainous countries of Europe much resembles the *agagrus*, and has in some places become so wild as to be difficult of approach, and to be obtained only by the hunter's rifle; the ears are small and upright; the size of the body is smaller, the hair coarser, the horns more vertical and turning outward, and the colors more varied with black and white. As the variety becomes removed from the wild original, the hair becomes finer, the ears large and pendulous, the horns either absent or multiplied, and the stature and proportions modified. The Persian goat resembles a small *agagrus*; the hair is long and coarse. The Welsh breed is large, generally white, with long fine hair, and with vertical horns about 8 feet long. There are small hornless breeds of goats in South America, the West Indies, and the Pacific islands, supposed to have originated from Africa. The Angora has long soft hair, mostly white, long ears, upright yellowish horns, and a sheep-like look. The famous Cashmere and Thibet breeds have long, straight, silky hair, large pendent ears, and slender legs; for an account of the uses of the hair of these goats, see the article CASHMERE. The Nepal goat is of a high and slender figure, of a black color, with an arched form of nose from convexity of the nasal bones, and long hanging ears of a whitish color. The goat of upper Egypt is of a brownish color and high stature, with long shaggy hair, arched nose, ample pendent ears, and the upper jaw so much shorter than the under that the lower incisors and chin are exposed as in the pug dogs. The varieties of the goat, as of other domesticated animals, from circumstances of climate, food, and the care and caprice of man, have become almost endless. This useful animal in primeval ages formed a great portion of the flocks of southern Europe, Asia, and northern Africa; figures of a very large race are found on the early Egyptian monuments; the goat preceded the sheep in northern and western Europe, predominating while the country was covered with forests. Goat skins were probably among the first materials used for clothing among the northern and Scandinavian nations. The milk of the goat is used for making cheese and for domestic purposes in mountainous regions, and is prescribed as a medicine in debilitated constitutions and pulmonary diseases. In the malarious regions of Asia and the East, cow's milk is regarded as a predisposing cause of bilious fevers and diseases of the liver, and goat's milk is therefore sub-

stituted; this custom might perhaps be imitated with advantage in malarious districts of the United States, Mexico, and the Pacific coast. The flesh of the kid is esteemed as food; from the skin are made fine gloves, various garments, and the real Morocco leather; from the hair of one variety are manufactured the costly fabrics of Cashmere. Many persons keep goats as pets, as they are lively and docile; in the public gardens of Europe they are used to draw children's carriages, obeying the rein and the voice like ponies.—The Rocky mountain goat is referred to the genus *capra* by Desmoulins, Harlan, Sundevall, Richardson, Bachman, and Van der Hoeven; but recent examinations go to show that in all its essential features and affinities it is an antelope, and belongs to the genus *aplocerus* (H. Smith). It resembles the goat and merino sheep in its figure and size; the horns are small, conical, smooth, nearly erect, and jet black. The outer hair is long, straight, and white, as fine and soft as that of the Cashmere goat; the chin is bearded; the external fleece hangs down all over the body and upper part of the legs; the under hairs are soft and silky like wool. It inhabits the highest and most inaccessible peaks of the Rocky mountains between the parallels of 40° and 65° N., and is most abundant in Washington territory; it is very difficult to procure; the mountain sheep (*ovis montana*, Cuv.), or big-horn, has been often mistaken for it by travellers; its flesh is hard and dry.—The goats are rarely found fossil, and belong nearly to the same epoch of creation as man, forming probably the first step by their domestication in his progress toward civilization; the dog, man's earliest companion, was a protector even in savage life, but the goat would lead him from the pursuits of hunting to the more peaceful occupation of the shepherd, with the consequent improvement in the arts of clothing and building. The goat (capricorn) was one of the signs of the ancient zodiac; the mythological Pan, the god of shepherds and the supreme power over nature, was represented with the horns and legs of a goat; the *agis*, or shield of Jupiter, was covered with the skin of a goat; this animal was sacred to several ancient divinities, and sacrificed at their altars, and even under the Jewish dispensation was emblematical of atonement. The goat may well be called the poor man's cow, supplying him at small expense with milk, cheese, meat, and materials for clothes. In the United States, the goat has been until recently considered one of the least valuable of domesticated animals. The large Sindh goat, from the mouth of the Indus, characterized by pendent ears 23 inches long, used in Asia for the table and the dairy; the Malta goat, which gives about a gallon of milk daily, and various Swiss breeds, were introduced some years ago, but were gradually neglected, so that it is now doubtful if their milk is made into cheese in any section; the hair was too coarse for manufacturing purposes, and their flesh inferior to

veal and mutton; in fact, farmers generally did not consider them worthy of notice as stock. By selecting the best varieties, and paying attention to climate, food, and other circumstances within his control, man has succeeded in transplanting and perpetuating the most valuable breeds in countries far removed from the original. The country of wool-bearing goats *par excellence* is the mountainous region of Thibet, extending thence northward to the arctic regions, eastward through Chinese Tartary, and westward through Russia to the confines of Europe. Dr. James B. Davis, of Columbia, S. C., in 1849 introduced into that state 7 females and 2 males of the pure Cashmere breed; in 1853 the flock of pure breed had increased only to 30, from the accidental circumstance of the young having been chiefly males; they had kids every spring, usually one at a birth; the half and quarter breeds with the common goat were much more numerous. He found them good for the table, easily fattened, with long fine hair equal in all respects to the imported stock, with a much heavier fleece; and the mixed breeds were a great improvement on the common goat. The pure males were readily sold at \$100 each, and the mixed breeds eagerly purchased by persons desirous of improving the common varieties. From the experiments thus far prosecuted it appears that the fleeces raised in this country closely approximate in fineness to the best Asiatic specimens, and the cross with the common goat shows no deterioration in the hair; the precious wool at the base of the hair in winter, averaging only 3 ounces to each goat in Cashmere, from which the costly shawls are made, deteriorates neither in quantity nor quality if proper regard be paid to the temperature of the locality. The value of the Cashmere fabrics is not so much in their fineness as in their durability, and their cost is very greatly increased by the difficulties, expenses, and taxes incurred in their transit from Thibet over land to eastern Europe. The demand for woollen fabrics of fine texture will always make it profitable to pursue this branch of industry, which is well suited to many parts of our country. The history of Dr. Davis's experiments is given in the "Agricultural Reports of the Patent Office" for the years 1853 and 1855; and in the same work for 1857 will be found a report on these Asiatic goats by Dr. Bachman, giving the results of the experiment under several heads. They are very hardy, suffering neither from heat nor cold, this hardness being imparted to half-blood intermixtures with the common goat; they have been free from disease during the 8 years since their introduction, are good breeders, take care of their young, and furnish an abundant supply of milk; the proportion of male offspring seems to increase with the age of the buck. Goats sometimes gnaw fruit trees, but prefer weeds, briars, and leaves to grass, and have been found beneficial to grass lands in summer by feeding on such growths; they are fond of the leaves

of young pines and cedars, and seem to require something of the kind to preserve them in health. The flavor of the flesh of the half-breeds is superior to that of lamb or mutton, somewhat resembling that of venison. They are not liable to be killed by dogs like sheep, as a herd of goats will form a ring and defend the kids and ewes. The fleece of the bucks was found to weigh, cut in April, from 5 to 7 lbs., and that of the ewes from 4 to 5 lbs.; that of the kids is fine enough for the finest shawls, and that of the old ewes and yearling bucks will make valuable cloth. The report says: "There is a large class of fabrics for which these fleeces are peculiarly adapted, namely, camlet and worsted goods and ladies' fabrics, as challies, mousseline de laine, gentlemen's clothing for summer, hosiery, &c." These are strong, handsome, durable, and of a lustre far superior to articles made from the wool of the alpaca and sheep; they also receive and retain the most brilliant coloring. The experience of Dr. Davis and others shows a remarkable tendency of the cross between the Asiatic male and the common female goat to assume the higher and more valuable characters of the former, becoming finer fleeced and more prolific. Many parts of the United States are suited to this Asiatic goat and its crosses; they need but little water, and would require to be fed in unfavorable localities only in winter; the districts best adapted to them are the sides of the Rocky and Alleghany mountains, the hilly and almost uncultivated region of the Carolinas and Georgia, the western country from Nebraska to western Texas and New Mexico, the mountain tracts of Virginia, North Carolina, Kentucky, and Tennessee, and the worn-out plantations and poor pine lands of the southern states; a single shepherd, with his trained dog, could guard a flock of several thousands against wolves, curs, and other carnivorous enemies. It has been ascertained that Cashmere goats brought from their mountains to the warmer plains of British India, where the mean annual temperature is 65°, lose the fine soft wool at the base of the long hair in the course of a single year; it may be stated as an important fact that the best fleeces require the mountainous districts of a warm country, and not a certain temperature without regard to elevation; the altitude as well as the latitude of a region should be considered in locating them. By attention to the breed, and selecting the finest and accidentally improved individuals, new and superior varieties may be produced, surpassing even the Cashmere originals. In all probability the Rocky mountain goat-antelope might be easily domesticated, and prove still another source of profit to the agriculturist and manufacturer.

GOATSUCKER, a nocturnal fassirostral bird, of the order *passeres* or *insectores*, and the family *caprimulgida*. The family is characterized by a short, very broad, depressed bill, with an immense gape extending beneath the eyes, and

rendered larger by numerous bristles for arresting their insect prey; the eyes are very large, and easily puzzled by the full light of day; the tarsi are short and weak, the toes long, the hind toe closely united to the base of the inner; the plumage is soft, enabling them to fly without noise. In the sombre colors and texture of the feathers, in the large head and eyes and nocturnal habits, they resemble the owls, but zoologically they come nearest to the swallow family. The name goatsucker is derived from the Latinized Greek appellative *caprimulgus*, which originated in the idea that they suck the mammae of goats, natural enough when the enormous size of the gape is considered; the French call these birds *engoulevents*, or wind swallows, and *crapauds volants*, or flying toads, probably on account of the great capacity of the mouth. Like the owls, they hide themselves by day, coming out toward sunset, and pursuing insects on the wing with great rapidity during the twilight; they make no nests, but deposit their eggs on the bare ground or in slight concavities; they are found in all parts of the world, but most abundantly in South America. There are 3 subfamilies: *steatornis*, or oil-birds, found in the West and East Indies, Australia, Africa, and South America; *caprimulgina*, alone represented in the United States; and *podagerina*, in Africa and South America. In the first family the genus *steatornis* (Humboldt) becomes so plump on the rich palm fruits of Guadeloupe and Trinidad in the breeding season that their fat is compared to that of olive oil, and as such is permitted to be used during Lent by the Catholic natives. Some species of the genus *nyctibius* (Vieill.) are as large as a short-eared owl. Among the *caprimulgina* are included the European goatsucker, the North American chuck-will's widow, whippoorwill, and night hawk, and the South American scissors-tailed goatsucker. The European species (*caprimulgus Europæus*, Linn.) is as large as a thrush, of a gray brown color, undulated and spotted with blackish brown, with a band of white from the bill to the nape; it nestles in the furze, and lays 2 eggs. From the nature of its food and its method of taking it, and its manner of flying, it is often called the square-tailed swallow; it is rather a solitary bird, feeds on nocturnal insects like moths and beetles, which are retained as it flies with open mouth by a viscid saliva, and perches longitudinally on a branch; it migrates during winter into southern Europe and northern Africa. The chuck-will's widow (*C. Carolinensis*, Briss.; *antrostomus*, Gould) is the largest of the North American species, being about 18 inches long, with an extent of wings of 26 inches; it has very strong bristles at the base of the bill, each with lateral filaments; the wings are long, and the tail slightly rounded; the prevailing color is pale rufous, the top of the head reddish brown with longitudinal black streaks, the last  $\frac{1}{4}$  of the tail feathers (except the 4 central) rufous white, with the outer webs of all mottled; the female

has no white patch on the tail; it is found in the southern Atlantic and gulf states. The popular name of the bird is derived from the sounds which it utters very clearly and strongly 6 or 7 times in quick succession in a melancholy tone; they are seldom heard in cloudy weather, and never, according to Audubon, when it rains. The flight is rapid, graceful, and elevated. It makes its appearance from the south in the gulf states about the middle of March; the male courts the female with great pomposity; no nest is made, but the eggs are laid among the dead leaves; if the eggs be disturbed, the birds remove them in their mouths (according to Audubon, who witnessed the fact), and place them in another locality; they probably remove the young in the same manner. They manifest a great antipathy to all kinds of snakes, and, though they cannot harm them, attempt to frighten them away by opening their immense mouths and making a strong hissing noise. They leave the United States about the middle of August. The whippoorwill (*C. vociferus*, Wils.) and the night hawk (*chordeiles Virginianus*, Briss.) will be described under their proper titles. The scissors-tailed species (*C. furcifer*, Vieill.), of Paraguay, is remarkable for the length of the outer feathers of the tail, gradually diminishing to the tip. Among the *podagerina* is the Leona goatsucker (*macrodipteryx longipennis*, Shaw), a native of Africa, having the innermost quill of the wings extremely prolonged and deficient in webs except at the end, and longer than the bird itself. The genus *podager* (Wagl.) has long wings and short even tail, and short and feathered tarsi; it is found in the warmer parts of South America, frequenting fields and moist places, usually in pairs, but occasionally in large flocks, chasing insects in the full light of day; it lays 2 eggs on the bare ground. Most of the goatsuckers have the inner edge of the middle claw pectinated, like a comb, for the purpose of cleansing the bristles of the bill from remains of insects and particles of dirt.

GÖBEL, TRAUGOTT FRIEDMANN, a German traveller and writer on chemistry, born in Thüringia in 1794, died May 27, 1851. In 1828 he was appointed professor of chemistry at Dorpat. In company with Claus and Bergmann he travelled in southern Russia in 1834, and embodied the results of his scientific investigations in his *Reise in die Steppen des südlichen Russlands* (2 vols., Dorpat, 1838). He wrote many manuals of chemistry, the principal of which is his *Grundlehren der Pharmacie* (4 vols., Erlangen, 1843-'4). His most celebrated work is the *Pharmaceutische Waarenkunde*, which was completed by Kunze.

GOBELINS, ROYAL MANUFACTORY OF THE, an establishment in Paris belonging to the French government, devoted to the production of tapestry and carpets. It is situated in the faubourg St. Marcel upon the Bièvre, being No. 270 rue Moufflard. It derives its name from Jehan Gobeelen, a Flemish dyer, who removed

hither in the middle of the 15th century, and almost monopolized for years the dyeing business of Paris. He erected a quaint unsightly building, which was known as "Gobelin's folly," and which afterward, passing into other hands, came to be used for a manufactory of tapestry, first by the brothers Cannaye, and about 1665 by the Dutchman Geuck and his skilful workman, Jean Lioudson, the latter first manufacturing the fabric there upon the *haute lisse*, or high loom. In 1667 Louis XIV., adopting the suggestion of Colbert, organized a distinct department for the production of the furniture and decorations of the royal palaces, calling it the *manufacture royale des meubles de la couronne*. The hotel of the Gobelins had a few years previously been secured with a view of continuing in it the tapestry manufactory. The direction was given to Lebrun, who painted his famous battles of Alexander the Great as patterns for this manufactory. The celebrated engraver Sebastian Leclerc was furnished with apartments and continued in the service of the establishment for 40 years to the time of his death. Artists were engaged by liberal offers to remove from the famous manufactory at Brussels, among whom was the elder Lefèvre and others distinguished by their copies of the cartoons of Raphael and Giulio Romano. The highest talent was directed to the production of original picture designs, and pupils were instructed as in a school of art. Works were also executed in marble, as tables inlaid with colored stones, and sculptures, of which some pieces are among the finest productions in this department of the fine arts. Though the works were up to this time open to private orders, their prosperity was chiefly dependent upon the patronage of the government; and when this was in great part withdrawn in the pecuniary embarrassments of the crown after the year 1694, the operations were greatly checked, and for a time during the reign of Louis XV. the establishment was closed. In 1791 a new system was introduced, and the operations were restricted to the production of tapestry. The workmen, instead of executing this as before by contract from the materials furnished them, were now employed by the year; and their attention was more particularly directed to the quality than to the quantity of the work they accomplished. The weaving of pictures in colored wool demanded as high manipulative talent as painting upon canvas. Six large rooms are devoted to the *hautes lisses*, or high looms, upon which the tapestries are suspended as the work goes on. The warp hangs from a horizontal cylinder, and as every yard or thereabout in length is completed, it is wound upon another cylinder in the lower part of the frame. The principal features of the design being traced with white chalk by the artist upon the stretched thread of the warp, he marks, with the aid of tracings from the picture, which he attaches to the warp, the exact positions of the light and dark shades. Then with the pattern conveniently

placed for reference, the artist stations himself against the back of the tapestry, and, with his worsteds and silks at hand, begins to work in the different colors. The vertical threads of the warp are divided by a heddle or cross stick which keeps half of them in advance of the rest; but those behind can be brought forward whenever required by means of small cords (*lisses*), one of which is attached to each warp thread. The left hand is introduced between the two sets of threads, taking up as many as need be, and through these the wooden needle with its worsted is next passed from left to right. The thread when stretched is piled with the point of the needle, and is then passed back in the contrary direction through the space opened by shifting the position of the front and back threads. By ingeniously combining the woofs, the colors are made to blend perfectly, and effects are obtained like those of painting. The work is so slowly executed that an artist is not expected to average in a year a production of more than about a square metre, or a little more than 39 inches square, the value of which may be about 8,000 francs.—In 1826 the manufactory of carpets, called *la savonnerie*, from an old soap factory in which the making of carpets had been carried on from the year 1615, was connected with the tapestry establishment. The operations here are conducted upon the high loom, of larger size than those in the tapestry department, and the workman is placed in front. The worsted employed is composed of a number of shades, sometimes as many as 9 or 10, combined so as to imitate exactly the model. The carpets are remarkable for smoothness and evenness of texture and their strength and fineness, excelling even the Persian in these respects. The colors and designs also are perfect. Some of them require from 5 to 10 years for their completion, and cost 60,000 to 150,000 francs. None are sold. The largest ever made was manufactured for the gallery of the Louvre. It consists of 72 pieces, the total length being more than 1,800 feet.—The establishment is open to the public every Wednesday and Saturday, and every second year an exhibition is had at the Louvre of its productions, together with those of Beauvais and Sévres. The most celebrated piece executed at this establishment is a picture, completed about the year 1844, of the "Massacre of the Mamelukes," after the celebrated work of Horace Vernet. It is kept in the rooms as the most perfect production for the study of the artists employed. In 1851 it was sent to the great exhibition at London. A number of exquisite pieces of less importance were sent to the New York exhibition in 1853, among which the "Subject taken from the Chase and Still Life" was referred to as excelling in the softness, delicacy, and brilliancy with which all the minute traits of both animal and vegetable life are rendered in these colored wools. In the "Report" of this exhibition, p. 186, is a full description of the Gobelin establishment.

GOBERT, NAPOLEON, baron, a French phi-



lanthropist, born in 1807, died in Cairo, Egypt, in 1838. He was the son of a general killed at Baylen, and the godson of Napoleon. He entered the army, in which he obtained little distinction. By his will the French academy and the academy of inscriptions were made his residuary legatees, on condition that the former should award  $\frac{2}{3}$  of the income of its share of the legacy as a prize to the author of the most eloquent work on French history that had appeared during the year preceding the distribution, and  $\frac{1}{3}$  to the one next in merit; and that the academy of inscriptions should award similar prizes to the authors of the first and second most learned and profound works on the history of France; this income to be paid annually to the recipients until better works of the same kind should appear. The heirs unsuccessfully contested the bequest, but the academies compounded with them, and secured an income of 10,000 francs each, which has since 1840 been disposed of in accordance with the provisions of the will.

GOBI, or COBI (Mongol, an elevated plain), also called SHAMO by the Chinese, an immense tract of country in central Asia, extending from a spur of the Altai chain striking out near the E. extremity of the Siberian government of Irkootsk to the point of intersection of the 3 vast ridges of the Altai, the Kuen-Lun, and the Himalaya, and occupying the table-lands between the first two of these ranges. It has a length from N. E. to S. W. of 1,800 m., and a width varying from 200 to 500 m., with an area of perhaps 600,000 sq. m. This immense tract is divided in its W. part a little N. of the middle by the Thian-Shan or Celestial mountains. It is generally also divided into the E. and W. desert. The line of this division is where the desert leaves the E. boundary of the Chinese province of Kan-su. Of the W. part, that which is included in the province of Kan-su is the least sterile of the whole desert, while that which lies W. of the province enclosed between the mountains is the most desolate region conceivable. Its surface consists of a fine loose sand, which is drifted about by the winds in waves like water. The water-shed between the Celestial mountains and Kuen-Lun is drained by the Yarkand and its confluent Kaahgar, flowing eastward into Lake Lop, just within the province of Kan-su. This lake has no outlet. Such lakes are numerous throughout the desert, especially in W. Gobi. The eastern part of Gobi is better known than the western, and is not quite so inhospitable. The Chinese term Shamo is applied especially to this part of the desert. In physical conformation it is a vast valley or basin of uneven surface, extending between the broken chain formed by the meeting of the Kuen-Lun and the above mentioned spur of the Altai on the S., and the Altai chain itself on the N. Like W. Gobi, it is a vast sea of sand, but this is coarser, so that it is not so much moved by the winds. It is drained toward the E. into the sea of Okhotsk by the confluent sources of the Amoor, and to the N. into Lake Baikal be-

yond the Altai by the Selenga and Orkhov. The soil of the entire desert is impregnated with salt, especially in the W., and the waters are brackish. In E. Gobi, in the mountainous districts which skirt the valley, are some fertile plains, where agriculture is a little attended to by the inhabitants, and yields a precarious subsistence. Pasturage is more commonly the occupation of the Mongolian tribes, who lead a nomadic life in these mountain fringes of E. Gobi. In W. Gobi also, around the numerous salt lakes, and on the banks of its steppe rivers, the Turkish Tartars pitch their tents and raise their cattle. The climate of the desert is intensely cold, and winter lasts 9 months. It frequently freezes and snows in July and August, although Gobi lies between lat. 35° and 50° N. The part of W. Gobi included in Kan-su is considerably settled, and has some important towns, as Hami, Ngansi, and Su, the last situated near the W. extremity of the great wall of China, which may be regarded as forming the boundary between the fertile lands and the desert.

GOD SAVE THE KING, a popular melody, commonly regarded as the national anthem of Great Britain. It has been ascribed to John Bull, chamber musician to James I., to Anthony Young, a London organist, and to Handel, and is even supposed to have been sung by the peasantry of southern France for centuries before it was known in England. Dr. Burney maintains that it was composed for the Roman Catholic chapel of James II.. The author was probably Henry Carey, a natural son of the earl of Halifax; and the tradition that Christopher Smith, Handel's clerk, was employed to correct the words as well as the music, gave rise to the assertion that it was the production of the latter composer, who was also accused of having appropriated the melody and rhythm from the old French composer, J. B. Lulli. "God save the King" was first published in the "Gentleman's Magazine" in 1745, and upon the landing of the young pretender in the same year became a rallying song for the adherents of the house of Hanover. About the same time it was introduced upon the stage by Dr. Arne, and has since retained its rhythmical form unaltered, although the melody and harmony have been much improved. The words are also essentially the same, the only changes being those rendered necessary by the introduction of new names at the accession of successive sovereigns. Under Victoria it is called "God save the Queen."

GODAVERY, a large river of British India, rising in the W. Ghats, in the district of Ahmednuggur, lat. 19° 58' N., long. 78° 30' E., and, after a S. E. course of 898 m. across the peninsula, flowing into the bay of Bengal by two principal channels. The delta commences at Pechakalunka, in lat. 16° 57' N., long. 81° 49' E., and contains an area of 500 sq. m. The banks of the river on each side are marked by ridges a few feet high, formed by deposits during the inundation. There are few or no obstructions to navigation, but the stream has been

little used as a channel of commerce, until within a few years measures have been taken to place steam vessels on it. In 1846 the East India company began the construction of an annicut or dam, 12,600 feet long, which secures during the dry season an unfailing supply of water in the delta of the river for irrigation and navigation. Boats are enabled to pass it at this time by means of a series of locks, but in the rainy season the waters are high enough to enable vessels to sail over the dam. The principal affluents of the Godavary are the Paira, Doodna, Manjara, Manair, and Wain Gunga.

**GODERICH, VISCOUNT.** See **RIPON, EARL OF.**  
**GODFATHERS AND GODMOTHERS,** persons who become sponsors for a child at its baptism, promising in its name that it shall lead a Christian life, and binding themselves to watch over its religious education. The custom of having sponsors probably originated in the infancy of the church, from the desire to prevent children from being brought up in idolatry in case their natural parents should die before they came to years of discretion. In the church of England the number of godparents is limited to 3; in the Roman Catholic church to 2. In England it was an old custom for godfathers and godmothers, every time their godchildren asked their blessing, to give them a cake, which was called a gods-kichell (or gods-cake). The usage for the sponsors to make presents to the child at the christening is of considerable antiquity. The customary gifts were gilt spoons, on the handles of which were graven images of the apostles. The rich gave a whole set of 12, but poor children often had no more than one. In Beaumont and Fletcher's "Noble Gentleman" Longueville is made to say:

I'll be a gossp, Beaufort;

I have an odd apostle-spoon.

Stow's Chronicle (1681) mentions a former custom of sponsors giving "christening shirts with little hands and cuffs, wrought either with silke or blew threed."

**GODFREY, THOMAS,** an American mathematician and mechanic, the inventor of "Halley's quadrant," born in Philadelphia, died in Dec. 1749. He had but a common education, and followed the business of a glazier in his native city; but accidentally meeting with a mathematical treatise, he was delighted with the study, and pursued it with such ardor and industry that he mastered all the books on the subject that he could obtain, and instructed himself in Latin in order to read mathematical works in that language. He borrowed a copy of Newton's *Principia* from James Logan, secretary of the commonwealth, and in 1730 communicated to him an improvement that he had made in the quadrant. In 1732 Logan gave an account of the invention to Dr. Edmund Halley of England in a letter, and Godfrey also prepared a description of it addressed to the royal society of London, but did not send it, awaiting the effect of the letter to Halley. No answer

was received after an interval of a year and a half, and then the invention of Godfrey was laid before the royal society by the botanist Peter Collinson. Meantime, in 1731, Mr. Hadley had presented a paper containing a full description of an improvement of the quadrant similar to that of Godfrey. The rival claims were investigated by the royal society, and it was decided that they were both entitled to the honor of the invention, and a reward of £200 was bestowed on Godfrey, in household furniture instead of money, on account of his intemperate habits. Different statements are made of the way in which the invention of Godfrey might have become known to Hadley. Dr. Franklin lived in the same house with Godfrey, and says that, like most great mathematicians whom he had met, he was not a pleasant companion, since he expected universal precision in every thing said, and was perpetually denying or distinguishing on trifles, to the disturbance of all conversation.

**GODIVA.** See **COVENTRY.**

**GODMAN, JOHN D.,** an American physician and naturalist, born in Annapolis, Md., Dec. 20, 1794, died in Germantown, Penn., April 17, 1880. Left an orphan and without property, he was apprenticed after a short schooling to a printer in Baltimore; but in 1814 he abandoned an employment which had never pleased him, enlisted in the navy, and was present at the defence of Fort McHenry. In April, 1815, he left the service with the purpose of following the medical profession, and began his studies under Dr. Luckey in Elizabethtown, whence he soon after removed to Baltimore and placed himself under Dr. Hall, and afterward under Drs. Wright and Davidge. His progress was so rapid that before he was graduated he made a reputation by a few lectures on anatomy delivered in place of Dr. Davidge. After obtaining his degree, in Feb. 1818, he practised successively in New Holland, Penn., in Anne Arundel co., Md., in Baltimore, and in Philadelphia. In 1821 he was appointed professor in the medical college of Ohio, at Cincinnati, but he held this post only a few months, and in 1822 returned to Philadelphia, to devote himself to scientific pursuits. A private class in anatomy which he organized at this time was largely attended, but his close application and the bad air of the dissecting room seriously impaired his health. In 1826 he accepted the chair of anatomy in the Rutgers medical school, New York, but before finishing his second course of lectures he was obliged to undertake a voyage to the West Indies, on his return from which he settled in Germantown. In spite of early disadvantages Dr. Godman was a good scholar, a linguist, and an attractive writer. He prepared the articles on zoology for the "Encyclopædia Americana" as far as the end of the letter C, contributed to the "American Quarterly Review" and various scientific periodicals, and edited the "Western Quarterly Reporter of Medical Science" in Cincinnati and the Philadelphia "Journal of the Medical

Sciences." His principal work is his "American Natural History" (3 vols. 8vo., Philadelphia, 1822-'8), beside which he published an "Account of some Irregularities of Structure and Morbid Anatomy;" "Bell's Anatomy," with notes; "Anatomical Investigations;" a translation of Levasseur's "Account of Lafayette's Progress through the United States;" "Rambles of a Naturalist;" numerous addresses, &c.

GODOLPHIN, SIDNEY, earl of, an English statesman, born in Cornwall about 1640, died Sept. 5, 1712. He began his political career under Charles II. as one of the grooms of the bedchamber, became one of the lords of the treasury in 1679, voted for the exclusion of the duke of York from the throne in 1680, was placed at the head of the treasury in 1684, and after the accession of James II. was retained in office as chamberlain to the queen, and became one of the chief royal advisers. He took office under William III., having become an almost indispensable part of the machinery of state, was placed at the head of the treasury, and on the accession of Queen Anne in 1702 was created lord high treasurer, being the first person who had held that office since the restoration. After the revolution he was led by Marlborough to doubt the stability of the new government, and he served it for 6 years while at the same time sending professions of attachment and promises of service to James. In 1706 he was created Viscount Rialton and earl of Godolphin, attached himself to the whig party, and the final result of his struggle with Harley for the premiership was his sudden and rude dismissal from office in 1710. Godolphin was a veteran courtier, and the most prudent and experienced of the financiers of his time. "Every government, therefore," says Macaulay, "found him a useful servant; and there was nothing in his opinions or in his character to prevent him from serving any government." He was one of the keenest gamblers and horse-racers of his time.

GODOY, MANUEL DE, a Spanish statesman, the favorite of Charles IV., born in Badajoz, May 12, 1767, died in Paris, Oct. 4, 1851. With a handsome figure and winning manners, he went to Madrid to seek his fortune. He obtained the notice first of the ladies of the court and then of the queen, whose favorite he became, and of the king, and his talent for intrigue gained him rapid advancement, till he had unrivalled ascendancy over Charles IV. With neither military nor administrative capacity to merit such distinctions, he was created duke of Alondia, generalissimo of the land forces, grand admiral of Spain and of the Indies, secretary of state, prime minister to succeed Aranda in 1792, chevalier of the golden fleece, and a grandee of Spain of the first class. When Louis XVI. of France was brought to trial by the convention, Godoy declared war against France, but by treaties concluded in 1795 and 1796 he separated Spain from England, and formed an alliance offensive and defensive with France. For this service the king gave him the title of "prince of the

peace." Maria Theresa de Bourbon, niece of the king, was constrained in 1797 to marry him. It is alleged that he was already secretly married to Josephine Tudo, the daughter of a military officer. Obligated in 1798 to resign his power for a time, while the English were blockading the Spanish ports, he resumed it again in 1801, when he signed the treaty of Badajoz, which divided Portugal between Napoleon and Charles IV., and which by a secret article gave to himself over \$3,000,000. His regular annual revenue at this time was not less than \$1,000,000, and he possessed unlimited power in the government. He however incurred the hatred of the nation, which saw its naval power annihilated by the battle of Trafalgar, and its commerce stopped by the blockade of its ports; and soon a strong party was formed against him under the patronage of the prince of Asturias, afterward Ferdinand VII. When Napoleon determined upon the dethronement of the Bourbons of Spain, and at the same time a criminal suit instigated by the prince of Asturias was pending against Godoy, the latter advised the royal family to take refuge in America. This project was not matured when an insurrection broke out against Godoy, who was seized by the populace in his hotel, and his life having been with difficulty saved, he was held prisoner to await the course of justice. Napoleon however, who knew his great influence over Charles IV., wished to avail himself of it to secure the renunciation of the crown of Spain by that monarch, and therefore obtained his freedom, and invited him to the conferences of Bayonne. Godoy drew up the act of abdication signed by the king, whom he then accompanied in his exile to Rome; and his immense possessions in Spain were confiscated. The partiality of the king for him remained after the ruin of both of them, and the ex-monarch often said to him regretfully: "I am the cause of all your misfortunes." Godoy lived in Paris after the death of Charles IV., and received a pension from Louis Philippe. In 1842 he was reinstated in his dignities in Spain, but he continued to reside in France. While in power in Spain he sought to effect some reforms, and opposed the influence of the clergy and the inquisition.

GODWIN, earl of Wessex, a Saxon noble, born about the end of the 10th century, died April 7, 1054. He was a cow-herd, but having ingratiated himself with Ulfr, the brother-in-law of King Canute, he received in marriage the daughter of that chieftain, and became the most powerful nobleman in England. In the interest of Harold Harefoot he procured the murder of Prince Alfred; but he was pardoned both by Hardicanute and Edward the Confessor, Alfred's brothers, and exerted himself to secure the crown for the latter. He afterward rebelled against Edward, and was obliged to flee the kingdom, but returning with a body of troops, forced his way back to favor. He was the father of Harold, the last Saxon king.

GODWIN, GEORGE, an English architect and author, born in Brompton, Middlesex, Jan. 28, 1815. He was instrumental in founding the London art union in 1836-7, of which for the last 20 years he has been chief honorary secretary, and to the "Art Union Magazine," now the "Art Journal," he became a constant contributor after its establishment in 1839. In 1844, having previously published "The Churches of London," he assumed the editorship of the "Builder," a periodical devoted to the interests of architects. His remaining works are: "Facts and Fancies" (8vo., 1844); "Buildings and Monuments, Modern and Mediæval;" "History in Ruins: Letters on the History of Architecture" (12mo., 1853); "London Shadows" (1854).

GODWIN, PARKER, an American journalist and author, born in Paterson, N. J., Feb. 25, 1816. His father was an officer in the war of 1812, and his grandfather a soldier of the revolution. He was graduated at Princeton college in 1834, and having studied law in his native town, was admitted to practice at the bar in Kentucky, but did not pursue the profession. From 1837 to the close of 1853, with the exception of one year, he was the coadjutor of his father-in-law, William Cullen Bryant, in the editorial management of the New York "Evening Post." In Feb. 1843, he began the issue of the "Pathfinder," a weekly periodical of a literary and political character, which was conducted with ability, and attained a considerable circulation, though it was discontinued at the end of 3 months in consequence of the failure of the publisher. In 1852 Mr. Godwin visited Europe, travelling chiefly in England, the south of France, Italy, and Germany. While connected with the "Evening Post" he contributed to the "Democratic Review" a large number of articles. It is worthy of notice that in that journal Mr. Godwin first advocated the important reforms which were afterward carried out in the constitution and code of New York. Mr. Godwin's acquaintance with German literature was exemplified by his translation of Zschokke's tales and of the 1st part of Goethe's autobiography. Other works of his are: a "Popular View of the Doctrines of Charles Fourier" (New York, 1844); "Constructive Democracy;" "Vala, a Mythological Tale," founded on incidents in the life of Jenny Lind, and fancifully illustrated by his friends the artists Hicks, Rossiter, Whitley, and Wolcott (4to., 1851); and a "Hand Book of Universal Biography," published as one of the volumes of Putnam's "Home Cyclopedia" (12mo., 1851). To "Putnam's Monthly," of which he was for a considerable time an editor, he contributed many articles on literary and political topics. His political essays in this magazine were in 1856 published in a volume, and attracted great attention. Mr. Godwin has of late years been engaged in the preparation of an elaborate history of France. In politics he is a member of the republican party, to which he has given liberal service both as a speaker and writer. The only official station he

has occupied is that of deputy collector for the port of New York, which he filled under Mr. Polk's presidency. As a political essayist, he has attained a brilliant and enduring position among the writers of the time.

GODWIN, WILLIAM, an English author, born in Wisbeach, Cambridgeshire, March 3, 1756, died in London, April 7, 1836. He was the son of a dissenting clergyman, was educated at the dissenting college at Hoxton, and in 1778 became minister of a congregation at Stowmarket, Suffolk. At the end of 5 years the incompatibility of this occupation with the new moral and political theories he had begun to entertain induced him to sever his connection with the ministry, and going to London he thenceforth devoted himself to literature. In common with the dissenters of that time, Godwin had previously been a zealous reformer; but under the influence of the political and literary associates whom he met in London, and of his own bold and original speculations, he now began to promulgate doctrines which, if carried out, would have subverted the whole structure of society. In 1793, having already acquired some literary reputation by his "Sketches of History" (12mo., London, 1784), and contributions to the "Annual Register," of which he was at one time principal conductor, he published the "Inquiry concerning Political Justice, and its Influence on General Virtue and Happiness" (2 vols. 4to.), in which an intellectual republic, founded upon universal benevolence, is advocated with persuasive eloquence. He never showed any inclination for public life, although in 1794 he appeared in the political arena as the champion of his friends Horne Tooke, Thelwall, Hardy, and others, who had been brought to trial on a charge of treason, on account of their connection with the "Constitutional Society," and by his "Cursory Strictures" on the charge of Judge Eyre, published in the "Morning Chronicle," Oct. 2, contributed materially, it is said, to their acquittal. In the same year appeared his most remarkable work, "Caleb Williams" (8 vols. 12mo.), a novel, designed to illustrate some of the peculiar views put forth in the "Inquiry concerning Political Justice." The interest of the story, however, is so predominant, that the social object of the author was entirely overlooked. The character of Falkland in this novel Hazlitt considers one of the finest in fiction. In 1796 he made the acquaintance of Mary Wollstonecraft, the author of the "Vindication of the Rights of Woman," and, in accordance with the views held by both of them respecting marriage, cohabited with her for 6 months, when for prudential reasons they were married. His wife died after giving birth to a daughter, who became the second wife of the poet Shelley. His "Memoirs of the Author of the Vindication of the Rights of Woman" (12mo., 1798) is a feeling tribute to her memory, but describes the details of her life with a minuteness which subjected him to considerable censure. In 1799 appeared "St. Leon" (4 vols.

12mo.), containing many incredible situations, but also many passages of splendid description and true pathos. It purports to be the autobiography of a philosopher who has become immortal by the discovery of the elixir of life. On this and the preceding novel his reputation chiefly rests, his others—"Fleetwood" (3 vols. 12mo., 1805), "Mandeville" (3 vols. 12mo., Edinburgh, 1817), "Cloudealey" (3 vols., 8vo., 1830), and "Deloraine" (8vo., 1833)—being in a much weaker vein. Among his other works were the tragedies "Antonio" (1800), and "Faulkner" (1807-8); a "Life of Chaucer" (2 vols. 4to., 1808); "Lives of John and Edward Phillips, Nephews of Milton" (4to., 1815); and a "History of the Commonwealth" (4 vols. 8vo., 1824-8), written with great impartiality, and valuable as a repository of facts. His last important work, "Thoughts on Man; his Nature, Productions, and Discoveries" (8vo., London, 1831), was a series of essays in the style of his earlier writings. For some years he carried on business as a bookseller, and under the name of Edward Baldwin published a number of children's books, small histories, and other compilations, some of which were by himself. In the latter part of his life Earl Grey bestowed upon him a clerkship in the record office, which enabled him to close his long literary career in comparative comfort. —MARY WOLLSTONECRAFT, wife of the preceding, and an authoress of note, born probably in Loddon, Norfolk, April 27, 1759, died in London, Sept. 10, 1797. Her education was acquired in a humble country school, and her father, a man of ungovernable temper, embittered her childhood by the cruelty with which he treated his family. A natural independence of character induced her to sever herself from such a parent, and upon the death of her mother she established a school at Islington, in the direction of which she was assisted by two of her sisters. The illness of a friend in Lisbon called her thither for a while, and upon her return to England she found her school ruined by mismanagement. After a short experience as a governess in the family of Lord Kingsborough, she determined to devote herself to a literary life, and by that means not merely supported herself, but materially aided her family. Having acquired considerable reputation by her "Thoughts on the Education of Daughters," and some works of fiction, as also by translations of Lavater's "Physiognomy" and Salzmann's "Elements of Morality," she ventured in 1791 upon a reply to Burke's "Reflections on the French Revolution," and soon after published her celebrated "Vindication of the Rights of Woman" (1791), in which the claim of woman to share with man the functions he has exclusively exercised, is argued with a boldness and ability which the numerous subsequent publications on the subject have never surpassed. Full of enthusiasm for the new ideas which the French revolution had inaugurated, she repaired to Paris, only to find her hopes

crushed by the overthrow of her friends the Girondists. She here also formed a connection with an American, who subsequently deserted her. She gave birth to a child, and in her despair endeavored to put an end to her existence. She sought relief from her troubles in writing her "Letters from Sweden, Norway, and Denmark" (1796), which she had visited while she had her home in Paris. In 1797 she was married to William Godwin. She died in childbed. Her posthumous works were published by her husband in 1798 (4 vols., 12mo.).

GODWIT, a bird belonging to the *scelopocidae*, or snipe family, and sub-family *limosina*, which includes also the curlew. It forms the genus *limosa* (Briss.), characterized by a long slender bill, inclined a little upward and slightly thickened at the tip, with sides compressed and grooved on both mandibles for nearly the whole length; the upper mandible a little the longer, and the gape moderate; wings long and pointed, the 1st quill the longest; tail short and even; tarsi slender, longer than the middle toe; toes long, the outer united to the middle by a membrane as far as the first joint; hind toe partly resting on the ground; claws short and obtuse. The shape is more slender and the bill and legs longer than those of the snipes. They are shy birds, frequenting the sea shore, living chiefly on worms which they draw from the mud; they are found in most parts of the world, though most abundantly in cold climates, and their habits and manners are like those of the curlew; the flesh is most excellent eating. The marbled godwit of the United States (*L. fedoa*, Linn.) is, in the female, about 20 inches long to the end of the tail, the bill  $4\frac{1}{2}$ , tarsus 3, and wing 9 inches; the male is somewhat smaller. The general color above is brownish black variegated with pale reddish, the former in bands and the latter in spots; below pale rufous, with transverse brownish black lines on the breast and sides; primaries dark brown on their outer webs, light rufous on the inner; tail light rufous, with brownish black bars; bill dark at the end, dull flesh color toward the base. It is found over the temperate regions of North America, and in South America; it is abundant in Florida during the winter, going to the north to breed in spring, and returning about the last of August within the limits of the United States. It is a shore bird, rarely seen many miles inland; when feeding it probes the mud with its long bill, plunging it in often for its whole length, in search of marine worms and small crustaceans. It is very shy, and a great favorite with the sportsman for the excellence of its flesh; its flight is quick and regular, in long and frequently changing lines.—The Hudsonian godwit, a smaller and much rarer American species (*L. Hudsonica*, Lath.), is about 15 inches long, with an extent of wings of 28 inches, tail 8, bill a little over 3, and tarsus  $2\frac{1}{2}$  inches; weight about 9 ounces. In the adults, the prevailing color above is brownish black, with spots and

transverse bars of pale reddish; upper tail coverts white; beneath, yellowish red, with transverse bars of brownish black, and sometimes the feathers tipped with white on the abdomen; tail black, white at the base and tipped with the same; under wing coverts black; shafts of primaries white. The young are cinereous above, with irregular brownish black marks, dull yellowish white below, upper tail coverts white, tail as in adult. It is abundant in the northern parts of this continent, but rare in the United States, and scarcely seen south of New Jersey except in winter; it breeds in the far north; the females are somewhat larger than the males; the flesh is excellent. This species resembles the black-tailed godwit of Europe, but may be distinguished by its black inner wing coverts.—The common godwit of Europe (*L. Lapponica*, Linn.), in the winter plumage, is deep brownish gray, the feathers edged with whitish; the breast brown gray, whitish underneath; rump white, radiated with brown; in summer the prevailing color is reddish, with a brown back, and the tail barred with black and white. The black-tailed godwit (*L. agiocephala*, Linn.) is in winter ashy gray, brownish on the back, and white on the belly; in summer the head, neck, and breast are reddish, with a brown mantle on the back spotted with reddish; below with brown, reddish, and white bands; the tail black, white tipped. Both these species are excellent as food. There are several other godwits described.

GOERTZ, GEORGE HENRIK, of Schlitz, baron, a Swedish statesman, born in Franconia in the latter half of the 17th century, beheaded at Stockholm, March 8, 1719. He entered the service of the duke of Holstein-Gottorp, but being sent on a diplomatic mission to Charles XII. of Sweden, was made prisoner by the Turks, and on his release from captivity was intrusted by Charles with the direction of the finances of his state. Although Sweden was then in a desperate condition, he immediately conceived vast plans for giving it a preponderance in the affairs of Europe, and united with Alberoni of Spain in schemes for placing the pretender upon the throne of England. His enlightened administration of affairs, and his great diplomatic skill, speedily restored Sweden to her former importance; but his financial measures made him unpopular, he was hated by the future queen, Ulrika Eleanor, and by the nobles, and after the death of Charles XII. he was arrested, condemned to death after a trial of only a few hours, and met his fate with intrepidity.

GOES, DAMIÃO DE, a Portuguese historian, born in Alemquer in 1501, died about 1578. Of an illustrious family, he was attached to the court at the age of 9 years, and made rapid progress in studies under the ablest masters. In 1523 he was sent on a diplomatic mission to Flanders, which was extended to Poland, Denmark, Norway, and Sweden, and formed intimate friendships with the most noted savants of those countries, as Olaus Wormius, Joannes

Magnus, Erasmus, and the artist Glarean. About 1584 he went to Padua, availing himself of the advantages of the university to pursue historical and philosophical studies, and at Rome associated with Bembo, Sadoleto, and other members of the sacred college. In 1540 he returned to Louvain, and at the siege of that city by the French in 1542 fought in its defence at the head of the university students, but was taken prisoner, and obliged to pay a heavy ransom. During the famine which desolated Lisbon in 1556, he sent several ships loaded with wheat for the relief of the citizens. He resided during the latter years of his life at Lisbon, holding the office of historiographer, and continuing the national chronicles. In 1571 he was arrested by the inquisition, and passed a period of exile in the monastery of Batalha. The most important of his works is the *Chronica do felicissimo rey D. Manuel* (Lisbon, 1566-'7; new eds., 1619 and 1749). He also wrote a chronicle of King John, and numerous works to make known to Europe the progress of Portuguese discovery and conquest, and published a collection of the Latin letters which he had sent to the principal savants of Europe.

GOES, HUGO VAN DER, a Flemish painter, pupil and successor of Van Eyck, flourished in the 2d half of the 15th century. He directed the festivities at Ghent in 1467, on the accession of Charles the Bold to the throne of Flanders. Near the end of his life he entered the monastery of Woodendole, in the forest of Soignies. His paintings are all of religious subjects, and their chief excellence is the grace and dignity of the countenances. His masterpiece is a "Crucifixion" in the church of St. James at Bruges. This picture was preserved during the iconoclastic fury in the 16th century by being coated with dark clay on which the 10 commandments were inscribed.

GOETHE, JOHANN WOLFGANG VON, the most eminent literary man of the 19th century, born in Frankfort-on-the-Main, Aug. 28, 1749, died in Weimar, March 22, 1832. His father, Johann Caspar Goethe, the son of a tailor of Frankfort, had raised himself to the dignity of an imperial councillor, and in 1748 had married Katharina Elizabeth, the daughter of Johann Wolfgang Textor, the chief magistrate of the city. Their first offspring, the subject of our sketch, inherited the best qualities of both parents. The father, a cold, stern, formal, and pedantic man, was a person of vigorous mind and of rigid will; and the mother was a simple-hearted, genial, vivacious, and affectionate girl, who loved poetry and the romantic lore of the nursery. In one of his poems, Goethe afterward said: "From my father I derive my frame and the steady guidance of my life, and from my dear little mother my happy disposition and love of story-telling." But he derived a great deal more from both; for the father, rigid disciplinarian as he was, early indoctrinated him in the knowledge of the classics and modern languages, and in the love of fine art; while

the mother gave him, beside her vivacity and animal spirits, that large and instinctive wisdom which comes of broad human sympathies. "Order and quiet," she said of herself, "are my characteristics. I despatch at once what I have to do, the most disagreeable always first, and I gulp down the devil without looking at him. When all has returned to its proper state, then I defy any one to surpass me in good humor." Again, she remarks: "I never bemoan any one—always seek out the good that is in them, and leave what is bad to Him who made mankind, and knows how to round off the angles." In these sayings we have a key to much in the character of the son. Goethe was a precocious child, very handsome and lively, and very sensitive. His early education was wholly domestic, in the company of his only sister Cornelia, to whom he was passionately attached. The variety of his studies was as remarkable as his rapid acquisition of knowledge was prodigious. Before he was yet 10 years of age, he wrote several languages, meditated poems, invented stories, and had a considerable familiarity with works of art. His little mind was also busy with the great events of the world. The great earthquake at Lisbon, the 7 years' war, the occupation of his native city by French troops, and the imperial coronation which took place at Frankfort, stimulated and enlarged the thoughts of the boy. Frankfort was a mediæval city, full of old associations and the remains of antique customs, just beginning to stir at the same time with the quick movements of a more modern trade and industry. None of its influences, old or new, were lost upon the susceptible child, whose position in middle life, while it brought him in contact with the most cultivated men of society, did not exempt him from occasional mixture with the lower orders, or from the ruder experiences of life. His first love for Gretchen, a girl in the humblest ranks, began amid a circle of forgers and delinquents, and came near leaving a deeper trace upon his career than the wound of the heart, which he felt so deeply, and of which some drops still trickled in his manhood, when he conceived the Margaret of his immortal *Faust*. In Oct. 1765, at the age of 16, Goethe was sent to Leipsic to begin his course of collegiate studies. An autobiography, which he wrote in his maturer years, passes over this part of his life with a few and stately words, but other evidences show that it was a time not of hard and varied study merely, but of much wild and frolicsome adventure. His youth, his beauty, his high animal vigor, his frank and candid manners, and above all his budding and irrepressible genius, made him the delight of every circle; and while he mastered with an easy grace the manifold sciences and arts of a German university, jurisprudence, medicine, logic, rhetoric, philosophy, morals, drawing, &c., he was no less *au fait* in those wayward and capricious sports, in the love-makings and the merry-makings, which are natural to this period of life. No

criminal indulgences are charged upon him, no prodigalities such as sully the early years of too many students; but he lived freely and buoyantly, preferring often the society of jovial companions, free thinkers and actors, to that of the more accepted respectabilities of a staid literary metropolis. The experiences acquired in this wise were more profitable to him than they would have been perhaps to others; for he had already fallen into the habit of turning his inward feelings into verse, and two dramas, *Die Laune des Verliebten* (the "Lover's Caprices") and *Die Mitschuldigen* (the "Fellow-Sinners"), not much in themselves, though important as indications of his dawning powers, grew out of his more erratic impulses. After a brief interval passed in sickness at home, during which he read the books of the alchemists, Goethe was transferred in 1770 to the university of Strasbourg, where he renewed his studies of jurisprudence and the natural sciences, enlarged the number of his acquaintances, including in the latter Herder and Jung-Stilling, and fell in love with the daughter of a dancing master, which however, as usual with his love passages, ended in a little sentiment. Herder's friendship was of the greatest use to him, as it expanded the horizon of his mind, introduced him to the reading of Shakespeare, Goldsmith, and other English classics, and deepened his moral and religious tone, by awakening within him a profounder sense of the grand poetry of the Hebrew Scriptures. But a singular episode of love absorbed for a while the time and thought of the young poet. He had fallen in with the family of a clergyman at Sessenheim, where there were two daughters, with one of whom, Frederika, he became desperately enamored, and they were finally betrothed, although in leaving the university in 1771 with his doctor's degree, he tore himself forcibly away from the bond and the attachment. The cathedral of Strasbourg, that masterpiece of old German art, shared with Herder and with Frederika the honor of having contributed to the development of his faculties. Impetuous and headlong as he was, there was already a tendency to be observed in the youth to value external objects, human and others, as they assisted in that deep and varied culture which he began to make the principal aim of his existence. The same year, however (1773), he had written a play, destined to attract public attention toward him, and to give the world its earliest glimpses of his extraordinary genius. This was *Götz von Berlichingen*, a dramatic version of the story of Götz of the Iron Hand, an old self-helping predatory burgrave of the 16th century, who made war upon his fellow barons, sometimes to increase his own store, and sometimes in defence of the poor, but always in a strong, manly, and unshrinking way. His lawless career represented the sturdy struggle of feudalism against an advancing civilization, and Goethe seized the incidents to present them in a clear, powerful, picturesque and dramatic whole. This work was the outbreak of a genius as rude and stalwart almost as

Goetz himself, asserting its freedom against the fetters of an artificial literary spirit—one of the earliest throes in that period of intellectual convulsion in Germany which has taken the name of the *Sturm und Drang*, or storm and pressure, period. When it was published in 1773, it excited the greatest enthusiasm in the literary world, and romantic dramas for a time became the fashion. In the interval Goethe had passed the time in wandering through the Rhine country. At Wetzlar he again fell in love, but as the object of his love, Charlotte Buff, was betrothed to one Kestner, to whom she was soon after married, the affection was not returned. A young and melancholy student, named Jerusalem, with whom Goethe was intimate, having committed suicide because of a similar unhappy passion which he cherished for the wife of one of his friends, Goethe wove the incidents of the two cases into a novel, which he called *Die Leiden des Jungen Werther* (the "Sufferings of Young Werther"). The sensation produced by it, when it was published in 1774, was prodigious. All the reading world went mad with sentimentalism. The most distinguished literary men, Zimmermann, Kotzebue, Lavater, Jacobi, and others, praised it as a profoundly philosophic romance, while the common people were carried away by its eloquence and pathos. Its chief success, however, arose from the fact that it expressed a certain sad longing and discontent which was then a characteristic of the age. "Werther," says Carlyle, "was the cry of that dim-rooted pain under which thoughtful men were languishing; it painted the misery, it passionately uttered the complaint; and heart and voice all over Europe loudly and at once responded to it." The same year he wrote a drama, founded on Beaumarchais's memoir on Clavigo, projected a drama on Mohammed, another on Prometheus, only a few lines of either of which were written, and revolved in his mind already the drama of *Faust*. Two love engagements, one with Anna Sibylla Mûnch, and the other with Anna Elizabeth Schönmann, immortalized in his works under the name of Lili, diversified the experiences of this period. The fame acquired by "Werther" brought Goethe under the notice of Charles Augustus, the grand duke of Saxe-Weimar, who in 1775 invited the poet to spend a few weeks at his court. Goethe went there, and the result of the friendship that then sprung up between the prince and the poet was such that Goethe thereafter made Weimar his permanent residence. He was created a *Geheimer Legations-Rath*, or privy councillor of legation, at a salary of 1,200 thalers per annum. His principal public occupation seems to have been to superintend the artistic pleasures of the court. Weimar was a small city, without trade or manufactures, but which made up for its want of commercial activity by its varied literary culture. It was filled with notabilities, among whom are to be noticed particularly Wieland, Herder, Musæus, Knebel, Seckendorf,

Corona Schröter, the dowager duchess Amalia, Frau von Stein, and afterward Schiller. In this circle Goethe at once took his place as the presiding deity. "He rose like a star in the heavens," says Knebel; "everybody worshipped him, and especially the women." His first years there were spent in wild and tumultuous enjoyments, in which "affairs of the heart," it is to be feared, did not always end with the heart. "There is not a woman here," wrote the simple-minded Schiller more lately, "who has not had her *liaison*." But Goethe's nature was too profound, his intellectual activity too great, to be long beguiled by the frivolities of masking, hunting, drinking, dancing, and dicing, and he resumed his more serious pursuits. The first fruit of his return (1779) was *Iphigenie auf Tauris*, a prose drama, which he afterward turned into an exquisitely beautiful and classic drama in verse. After a visit to Switzerland the same year, described in his *Briefe aus der Schweiz*, he composed a little opera, called *Jery und Bätely*, full of Swiss inspirations. He also began to devote himself strenuously to the study of natural science, in which he became a proficient. The novel of *Wilhelm Meister* was at the same time in progress, and many of his best small poems were produced at this period (1780-'83). In the year 1786 he made incognito a long-wished-for journey to Italy, where he passed nearly two years in the most laborious study of its antiquities and arts, and in the composition of a drama suggested by the life of Tasso at the court of Ferrara. He was so absorbed in the past of Italy that he paid little attention to its present condition or people, save that he visited the mother of the famous adventurer, Count Cagliostro, to whom he introduced himself in disguise. The narrative of his travels, *Die Italienische Reise*, contains the most charming descriptions of the scenes through which he passed. On his return to Weimar, in 1788, he published *Egmont*, a romantic drama, full of passion and interest, representing a sombre and tragic episode in the revolution of the Netherlands, but in which he has not confined himself at all to the incidents of actual history. The character of Oläarchen, in this piece, is by many regarded as one of his most successful female creations. A relation with Frau von Stein, which Goethe had long maintained, was now broken off, but the poet soon formed another with Christine Vulpius. She was uneducated, and lived in some domestic capacity in his house; but, in spite of the enormous scandal which the new tie occasioned even in Weimar, Goethe afterward married her, to legitimate his son. In 1792 Goethe accompanied the army of the king of Prussia and the duke of Brunswick in their campaign into France, of which he wrote an account. The results of his scientific studies appeared soon after in his *Beiträge zur Optik* ("Contributions to Optics"), and his *Farbenlehre* ("Theory of Colors"), in the latter of which he had the hardihood to question the correctness of the Newtonian doc-



trines on the subject. He wrote also on the metamorphosis of plants, and on topics of comparative anatomy. In all these he displayed a remarkable penetration and sagacity. His acquaintance with Schiller, who with him divided the suffrages of the poetic German world, began at Jena in 1794, and though their intercourse was cold at first, it ripened into one of the most enduring and beautiful friendships in literary annals. Schiller's influence upon him was both stimulating and ennobling, and from this time forth we find him engaged in producing his grandest works. The first part of *Wilhelm Meister* appeared in 1795. *Hermann und Dorothea*, a pastoral poem in hexameters, the most perfect of his minor productions, was written in 1797; the *Achilleis* was executed the same year; and he engaged in friendly rivalry with Schiller in bringing forth a series of ballads, of which Goethe's part, *Die Braut von Corinth*, *Der Zauberlehrling*, *Der Gott und die Bajadere*, *Die Schatzgräber*, are among the masterpieces of German literature. Even these, however, were only the preludes of what he was destined to do; for the *Faust* was still revolving itself in his thoughts, and the *Wilhelm Meister* went steadily forward. At last, in 1805, the great work of his life saw the light. The fable of *Faust* had been familiar to him as a child, he had thought of it and labored upon it during the whole of his youth, and now in the ripeness of his manhood it had taken its final shape, and came forth in the most profound, varied, touching, and wonderful drama that the world ever saw. "It appeals to all minds," says a critic, "with the irresistible fascination of an eternal problem, and with the charm of endless variety. It has every element—wit, pathos, wisdom, buffoonery, mystery, melody, reverence, doubt, magic, and irony; not a chord of the lyre is unstrung, not a fibre of the heart untouched." "It is at once a problem and a picture; the problem embraces all questions of vital importance; the picture represents all opinions, all sentiments, all classes moving on the stage of life." Such a work raised Goethe to the highest pinnacle of fame, and he was universally acknowledged to be the first poet of his age, and the peer of those immortal men, the Homers, the Æschyluses, the Dantes, and the Shakespeares, who appear only at an interval of centuries. If Goethe had died in 1806, he would have achieved a greater renown than any other modern man of letters; but he was destined to live 26 years longer, years of contentment, labor, productivity, and honor. The stormy and errant impulses of his youth had been subdued; he had mastered himself and his circumstances; the great problem of life, which had filled him with strife and impatience, lay clear before him; his circumstances were easy; and his position at the head of German literature, which he had himself brought out of chaos or formalism into orderly vigor, gained him the homage of Europe. A more genial, active, use-

ful, and distinguished old age has seldom been enjoyed. His good friend Schiller and other friends were dead; others again, friends of earlier days, were separated from him in sympathy by the large strides which his intellect had made in various paths of thought; and a sombre hue fell upon, without clouding, the serenity of his later years. Moreover, the external events of the world were full of trouble and agitation. It was the era of Napoleon's conquests. Germany palpitated with the rest of Europe in throbs of war; and the beloved grand duke of Weimar was drawn into the very vortex of commotion. On Oct. 14, 1806, the battle of Jena was fought, and Goethe heard in his calm home the reports of the cannonades. Soon that calm home was invaded; the French troops entered his house, ransacked his cellars, penetrated even to his bedchamber, and, though they treated him with respect, filled his soul with indignation and wrath. Goethe had all his life been averse to the disturbing influence of politics. His impassiveness under the tempestuous influences of the time had brought upon him the reproach of want of patriotism and of indifference to the welfare of humanity. But when the French approached Weimar, and Napoleon exhibited his petty spite against Charles Augustus for his active sympathy with his countrymen and allies, the long-pent feeling of the old poet burst forth. "Misfortune!" he exclaimed to Falk, "what is misfortune? This is misfortune, that a prince should be compelled to endure such things from foreigners. And if it came to the same pass with him as with his ancestor, Duke John, if his ruin were certain and irretrievable, let not this dismay us; we will take our staff in our hand and accompany our master in adversity as old Lucas Cranach did; we will never forsake him. The women and the children, when they meet us in the villages, will cast down their eyes and weep, and say to one another: 'That is old Goethe and the former duke of Weimar, whom the French emperor drove from his throne because he was so true to his friends in misfortune; because he visited his uncle on his death-bed; because he would not let his old comrades and brothers in arms starve.'" "At this," adds Falk, "the tears rolled in streams down his cheeks. After a pause, having recovered himself a little, he continued: 'I will sing for bread! I will turn strolling ballad-singer, and put our misfortunes into verse! I will wander into every village and every school wherever the name of Goethe is known; I will chant the dishonor of Germany, and the children shall learn the song of our shame till they are men; and thus they shall sing my master on to his throne again, and yours off his!'" This characteristic revenge of the poet, however, was never realized; and as the noise of the French cannon withdrew from Weimar, he began to pipe once more in his old peaceful strain. All through the revolutionary tumult, in fact, he took refuge in his studies and scientific experiments. On an interview with

Napoleon, too, which is to be remarked, as it brought face to face the two foremost men of the age, he scarcely remembered the enthusiasm with which he had spoken to Falk. Napoleon is said to have observed: *Vous êtes un homme*, and fell to criticizing his works, especially *Werther*, which he had read, he said, 7 times. Goethe was flattered by the appreciative words of the warrior, was invited to Paris by him, and afterward was decorated with the cross of the legion of honor. In 1809 Goethe printed the most exceptional of his novels, the *Wahlverwandtschaften* ("Elective Affinities"), in which the charms and graces of his style are employed in the description of the impulses which spring from the collision of passion and duty in the relations of marriage. By the title of the book, and in the whole spirit of it, he would represent that sexual affinities follow the same inevitable law as chemical affinities, and that humanity struggles impotently against the dictates of nature. Like all his productions, this was suggested by circumstances in his own experience. The work shocked the moral world, in spite of the beauty with which it was written, and to this day tasks the ingenuity of those of his admirers who seek to defend it from attack. His next volumes were of a less doubtful kind; in 1813 the ballads *Der Todtenkranz*, *Der getreue Eckart*, and *Die wandernde Glocke*; the *Dichtung und Wahrheit*, an autobiography, and the *Westöstliche Divan*, a marvellous collection of oriental songs and poems. His studies of science and contemporary literature were meantime never remitted. In 1816 he published an art journal, *Kunst und Alterthum*, to which he contributed largely; and in 1818 the second part of *Wilhelm Meister*, the *Wander-Jahre*. In 1825 the jubilee or 50th year of his residence in Weimar was celebrated in a grand public festival. In 1831 the second part of *Faust* appeared, a feeble continuation of the first part, obscure, mystical, and destitute of organic vitality, but full of passages of rare splendor, profound thought, grotesque humor, and bewitching melody. He supposed himself, and many critics supposed, that under the motley garb of the poem there is a deep significance, although few have succeeded in detecting it, while Goethe's own explanations are arid and unsatisfactory to the last degree. As a poem, it cannot be denied that it was a failure, even if we admit that as an enigma, covering some recondite philosophy, it deserves the closest study. The songs at least, and the lyrical parts, are excellent. The old man had lost some of the vigor of his thought, but his feelings were still exuberant, and the singer remained. "If Goethe," says an admirer of his, "everywhere great, is anywhere greatest, it is in his songs and ballads. They are the spontaneous outpourings of his mind in all its moods; a melodious diary of his daily and almost hourly fluctuations of feeling; the breathings of his inward life; the sparkling perennial jets of his momentary affections and thoughts. There is the perpetual freshness and

bloom about them of new spring flowers. Even when they seem most trivial, they ring through us like snatches of music. So perfect is the correspondence of form and substance that their charm as a whole defies analysis. It is felt, but cannot be detected. Then, again, how diversified they are! Some as simple as the whimperings of a child; others wild, grotesque, weird, and unearthly; and others again lofty, proud, defiant, like the words of a Titan heaping his scorn upon the gods." One year after the completion of the *Faust*, Goethe was taken ill of a cold, which turned into a fatal fever. Up to the hour of his death, however, he prosecuted his intellectual pursuits. His last writing was an essay on the dispute between Geoffroy, St. Hilaire and Cuvier, on the question of unity of composition in the animal kingdom; and his last words, as the breath left his body, were: "More light." He was then in the 88d year of his age. A seal, with an inscription from one of his own poems, *Ohne Hast, ohne Eile*, sent to him on his birthday in 1831, by 15 Englishmen, had given him great delight, for among the Englishmen who participated in the homage were Wordsworth, Walter Scott, Southey, Professor Wilson, Lockhart, Lord Leveson Gower, Procter, and Thomas Carlyle. These were the great lights of England bending toward the greater light of Germany. Goethe was the master spirit, the spokesman, as Carlyle says, of his age, the artist *par excellence* of the 19th century.—The letters of Goethe are among the best illustrations of his character. They are, in the chronological order of the periods covered by their dates, those to friends in Leipsic (published in 1849), to Merck (1835-'47), to Jacobi (1846), to Lavater (1833), to Herder (1853), to Knebel (1851), to Klopstock (1833), to the countess Augusta of Stolberg (1839), to Frau von Stein (1848-'51); his correspondence with Schiller (6 vols., 1828-'9; 2d ed., 1856; translated into English by G. H. Colvert, Boston, 1845), with Zelter (6 vols., 1833-'4), with A. W. Schlegel (1846), with the baron von Stein (1846), with Nic. Meyer (1856), with Döbereiner (1856), with Reinhard (1850), with Gruner (1853), with C. F. L. Schultz (1836), and with the councillor Schultz (1853). A collection of his letters was published at Berlin (1856 *et seq.*). His correspondence with a child (Elizabeth or Bettina von Arnim) is not genuine. See Gervinus, *Ueber den Goetheischen Brief-Wechsel* (Leipsic, 1836). The most important notices by his contemporaries are those of Eckermann, *Gespräche mit Goethe* (Leipsic, 1836; translated into English by S. M. Fuller, Boston, 1839), and Falk, *Goethe aus persönlichem Umgang dargestellt* (Leipsic, 1839). The best biographies are by Viehoff (4 vols., Stuttgart, 1854), Schäfer (2 vols., Bremen, 1851; 2d ed., 1858), and G. H. Lewes (3 vols., London, 1855; Boston, 1856; translated into German, Berlin, 1857-'8). The oldest complete edition of his works is that of Stuttgart and Tübingen (40 vols., 1827-'31; to which his posthumous

works were added, 15 vols., 1838-'4). The best later editions have appeared at the same places in 2 vols. (1836-'7), in 40 vols. (1840), in 80 vols. (1850-'51 and 1856-'7), and in 40 vols. in the Cotta edition of the German classics. His *Faust* has been translated into English nearly 80 times, the version of Hayward, in prose (London, 1838), and that of C. T. Brooks, the metre of which precisely corresponds to that of the original (Boston, 1857), being among the most esteemed. Retzsch's 26 outlines to *Faust*, engraved from the originals by Henry Moses, appeared in London in 1848. The *Wilhelm Meister's Lehrjahre* was translated by Thomas Carlyle (Edinburgh, 1824), and the *Dichtung und Wahrheit* (autobiography) by Parke Godwin (New York, 1847). Many of his works are included in Bohn's "Standard Library," and translations of several of the shorter ones have been more than once published separately.

GOFFE, WILLIAM, a general in the army of Cromwell, and one of the judges who voted the death of Charles I., born about 1605, died in Hadley, Mass., in 1679. He was one of the most fervent of the Puritans, was a devoted adherent of Cromwell, and one of the best officers of the parliamentary army. After the death of the protector and the restoration of the Stuarts, he escaped from the vengeance of Charles II. to America, and was in 1660, with his father-in-law Edward Whalley, received with courtesy by Gov. Endicott at Boston. Warrants soon after arrived for their arrest, a price was set on their heads, and Indians as well as English were sent in pursuit of them. They removed from house to house, living in mills, in the clefts of rocks on the seashore, and in caves in the forests. They hid themselves for months in a cavern near New Haven, from which they issued only by night. This retreat was discovered, and they fled successively to Milford, Derby, and Branford. At length they found an asylum in the house of a clergyman at Hadley, where Goffe passed the remaining 15 years of his life in wearisome and repining solitude. In 1675 the town of Hadley was surprised during a religious service by the Pokanoket Indians under their celebrated chieftain Philip. The inhabitants were about to fall beneath the tomahawk when an old man, with a long white beard, strangely armed and dressed, appeared in the church, rapidly harangued and rallied the disheartened colonists, disposed them for a charge upon the Indians which he himself led, and put the savages to flight. This unexpected saviour was the regicide Goffe, who in the moment of victory disappeared again for ever, leaving the colonists in the persuasion that a heavenly messenger had fought for them.

GOGGRA, GOGRA, GHOGRA, SARJOU, SARDA, DEWA, or KANAR (Hindoo, *Gharghara*; the *Sareyu* of Hindoo mythology, and according to Rennel the *Agorames* of Arrian), a sacred river of N. Hindostan, and one of the principal tributaries of the Ganges. Its remotest feeder appears to be the W. Kalee, a stream rising on the S. W.

declivity of the Himalayas, on the N. boundary of the British district of Kumaon, lat. 30° 28' N., long. 80° 40' E. About 106 m. from its source it is joined by the W. Sarjou, and from that point is known as the Goggra. It afterward takes a S. E. direction, is swelled by accessions from Nepal and Kumaon until it attains a width of about 450 feet, and joins the Ganges 100 m. above Benares. It is deeper than the Ganges, and is navigable throughout the year nearly to the borders of the plain.

GOITRE, an elastic swelling on the front and sides of the neck, arising from a hypertrophy of the thyroid gland; it is also called bronchocele and Derbyshire neck. It is generally soft and yielding, and varies in size from that of a nut to a mass surrounding the greater part of the neck, sometimes descending far upon the chest; it is usually slow in its growth, and may increase in either lateral lobe or in the median isthmus; it is accompanied by neither tenderness nor discoloration of the skin, and is generally definitely circumscribed. When of small size it occasions no inconvenience; but when large its weight and pressure upon the trachea, œsophagus, vessels, and nerves, cause headache, difficulty of breathing and swallowing, congestion of the brain, with dizziness, lividity of the face, protrusion of the eyes, alteration of the voice, dulness of hearing, obstinate cough ending in pulmonary disease, and threatening even apoplexy and suffocation. The anatomical character of the disease is the enlargement of the cells of the gland, which are filled with a viscid fluid or with blood; in old cases the tumor may become hard, and partly bony. All ages are subject to goitre, but young persons and the female sex are most liable to it; it is also hereditary. Though occasionally sporadic, it is essentially an endemic disease in cold and damp countries, as in the deep valleys of the Alps, where the air is moist, cold, and stagnant; it is most common in mountain valleys of the Alps, Pyrénées, the Himalaya chain in Asia, the Cordilleras in America, the high regions of Scotland, and the chalky districts of Derbyshire and Nottingham in England. Though often connected with cretinism, it does not appear to be a scrofulous disease; neither is it confined to persons living in poverty and uncleanness, for it is the sad inheritance of many wealthy families. Various causes have been assigned for goitre, but none of them entirely satisfactory; the most probable are, the insufficient illumination by the sun, the moisture, and stillness of deep valleys; deleterious emanations from clayey soils; the use of snow water, or that from springs arising from calcareous formations; the deoxygenation of water from great elevation, or its contact with metallic and organic matters eagerly absorbing oxygen. It seems to be connected rather with the geological than with any other character of a region. Goitre may be distinguished from other tumors in the neck, by its shape, consistence, and general development on both sides. The

prognosis in a person advanced in life is unfavorable, but in early life it may be cured. The remedy *par excellence* for this disease is iodine, both internally and externally, either alone or combined with potash and iron; the patient should be removed from the infected district to the sea shore, and a tonic regimen be pursued. When suffocation is imminent from the pressure of the tumor, relief may be obtained for the time by puncture, the seton, ligatures of the supplying arteries, or by extirpation of the gland; the last three are dangerous to life, and have proved fatal, and the first three may fail even if the patient survive the operations. The usual treatment is simply palliative, iodine with tonics and narcotics. There is a form of goitre not uncommon in anæmic females in this country and in England, with the usual symptoms of the Alpine disease, though to a less extent, and relieved by the tonic treatment of anæmia.

**GOLCONDA**, an ancient city and fortress of India, in the territory of the Nizam, 7 m. W. of Hyderabad, lat.  $17^{\circ} 22' N.$ , long.  $78^{\circ} 29' E.$  The fortress stands on a rocky eminence, and is a large and strong edifice. It is now chiefly used as a prison, and as a depository for the treasures of the Nizam. About 600 yards from the fortress are the tombs of the ancient kings of Golconda. Each mausoleum occupies the centre of a large quadrangular platform, which is approached on every side by granite stairs. They are mostly constructed of gray stone, ornamented with stucco and Indian porcelain, whose colors retain all their pristine brilliancy, and on which are engraved in white characters various extracts from the Koran. These mausolea are very numerous, and have a striking and impressive appearance when viewed from a distance. Golconda was formerly renowned for its diamonds, but they were merely cut and polished here, being generally brought from Partaill in the S. part of the Nizam's dominions. Golconda was anciently the capital of a powerful kingdom, which arose on the overthrow of the Bahmani empire, but it was taken by Aurangzebe and annexed to that of Delhi.

**GOLD**, a precious metal, ranking the first in beauty and value among useful metals from the earliest times to the present day; distinguished for being the only metal of a yellow color, and for possessing in the highest degree the properties of ductility and malleability. In chemistry its symbol is Au, from the Latin *aurum*, gold; its equivalent number 98.5, or, as adopted by many chemists, the double of this, 197. Its density varies according as the metal is more or less compressed; it is rated when hammered at from 19.258 to 19.4. In a finely divided state, precipitated from its solution by sulphate of iron, it has proved of specific gravity 20.72. When pure the metal is nearly as soft as lead, and is then susceptible of its greatest extension by beating or wire drawing. (See **GOLD BEATING**.) In thin leaf it is transparent, and the transmitted light is of a green color; by heat the color changes to ruby red, and this color the

metal finely divided imparts under certain conditions to glass. Its melting point is variously given as  $2016^{\circ} F.$ ,  $2192^{\circ}$ ,  $2518^{\circ}$ , and  $2590^{\circ}$ . In the heat of furnaces it is not volatilized; but gold wire is dispersed in vapor by the compound blowpipe, by a powerful convex lens, or the electric battery. As the current traverses it, the vapors produced may be collected upon a sheet of paper placed beneath the wire; the paper is stained a purplish brown by the deposit of finely divided gold; a sheet of silver may be thus gilded. When fused in large quantity and allowed to cool slowly, cubical crystals are sometimes observed to form; crystals of native gold have been found of octahedral forms, from which the regular octahedron is supposed to be the primary form of the crystal. Gold is not acted upon by alkalies, simple acids, except selenic, nor by the oxygen of the air even when long exposed in a fused state. Neither does sulphur affect it; but it is dissolved by bromine and chlorine, or by any combination of acids or other substances in which free chlorine is present. This gas, as it is generated in mixtures, is a powerful solvent of gold; and to it is due this property of the compound called *aqua regia*, formed of 4 parts of hydrochloric and 1 part of nitric acid. Gold forms alloys with most of the metals; silver or copper increases its hardness and renders it better adapted for wear when used for coins, jewelry, or plate. The compound is also more fusible than pure gold. The solder for gold trinkets is 1 part of copper to 5 of gold, or to 4 of gold and 1 of silver. With mercury gold unites to form an amalgam. Mercurial fumes, even, coming in contact with gold, instantly combine with and whiten it. The mercury may be driven off by heat. (See **AMALGAM**.) Gold is obtained from its solutions in various forms. The precipitate by sulphate of iron is a dull brown powder, which by pressure acquires the metallic lustre and color. The precipitate by oxalic acid is yellower and more metallic in appearance. The gold left on evaporating its solution in chlorine is of a spongy character and dull hue; by annealing it becomes more dense and yellow like the metal, or by percussion is readily welded together. (For modes of preparing sponge gold and its uses, see **DENTISTRY**.)—In nature, gold is almost exclusively found in a metallic state. It is a product of veins and beds in the igneous and metamorphic rocks, being dispersed through the quartz, pyrites, and decomposed pyritous and other matters with which these repositories are filled. It is also of common occurrence sparsely disseminated through the rocks themselves. The particles are often of conspicuous size, and the veinstones are sometimes found traversed by strings of gold, which tie the mass together; rich quartz specimens are to be seen in which the gold occupies the greater bulk. In pyritous ores the gold is more commonly invisible, owing either to the extreme minuteness of the particles, or to the metal being chemically combined with the py-

rites to form a double sulphuret of iron or of copper and gold—a question which will be again noticed in the course of this article. The ochreous ores, resulting from the decomposition of the pyrites, are often rich in the most minute and invisible particles of gold. As an incidental product gold is met with in almost all mines in the igneous and metamorphic rocks, of silver, lead, copper, nickel, cobalt, &c. It is said to accompany the common mineral iron pyrites, almost universally, in exceedingly minute proportion; and a professor of the English school of mines is reported to have detected it in every variety of metallic lead, and in litharge, minium, and other salts of lead. By the disintegration and crumbling away of the talcose and granitic rocks which contain the auriferous veins, the contents of these are swept down to lower levels, and the gold by its density seeks ever the lowest places among the moving materials. Thus are produced the auriferous gravel deposits in alluvial formations—the golden sands of the rivers; and so have they been gathering for long ages past and forming deposits, some of which are now seen in situations apparently out of reach of such agencies. In these deposits, when stripped of the clay and sands which cover the lowest and richest layer, there is found in the irregular shaped cavities of the surface of the rock, in pockets and in piles against the projecting strata, the riches of ancient veins, it may be, of vast extent. By washing away the intermixed earthy and stony matters, the metal is obtained in dust, flattened scales, small lumps, and nuggets of all sizes and shapes, the larger pieces rounded by attrition, or ragged from the irregular forms they held in their original hard quartz matrix. Their size is commonly greater than that of gold found in the veins near by, a fact no doubt correctly explained by Mr. Lieber, the state geologist of South Carolina, by the tendency of gold like many other substances to form aggregations of its particles in the presence of chemical changes taking place in the substances associated with it. As its pyritous gangue decomposes under the influence of atmospheric agencies, the gold particles collect and unite, somewhat as they cake together when its amalgam is decomposed by heat. In these deposits the largest lumps of gold ever met with were discovered, as that of Cabarrus co., N. C., of 28 lbs. avoirdupois, or 37 lbs. troy, found in 1810; the mass weighing 96 lbs. troy in Zlatoust, a district of the southern Ural, in 1842, and now in the imperial school of mines at St. Petersburg; the mass called the Blanch Barkly nugget, which was exhibited in London, and weighed 146 lbs. 3 dwts. troy, of which 6 oz. only were estimated as matrix; and the still larger mass said to have been found at Ballarat of more than 184 lbs. troy. Though in a metallic state, gold is never obtained pure. Silver is always alloyed with it, but in no definite proportions. The purest specimen is probably one from the Ural, near Ekaterinburg, analyzed by Rose,

which gave gold 98.96, silver 0.16, copper 0.35, in 100 parts; its specific gravity was 19.099. The product of California is much of it very near the richness in gold of the American and French gold coins, which is 900 parts in 1,000. Its average, however, is stated to be  $\frac{1775}{1000}$  to  $\frac{1855}{1000}$ , and that of Australia  $\frac{1660}{1000}$  to  $\frac{1855}{1000}$ . A specimen of California gold containing silver 8.80, gold 90.70, and iron 0.38, was of specific gravity only 14.6, and by fusing this was increased to 17.48. Gold from the Chaudière, Canada, of specific gravity 17.60, analyzed by T. Sterry Hunt, gave gold 87.77, silver 12.23; another specimen in fine scales, of specific gravity 16.57, produced gold 89.24, silver 10.76. Copper, palladium, and rhodium are also met with as alloys of gold. In Transylvania veins are worked producing an alloy of tellurium, gold, silver, and antimony; the tellurium commonly constitutes from 55 to 60 per cent., and the gold from 25 to 30 per cent. The same compound has been recognized at Gold Hill, N. C. Gold occurs in a few other combinations also with tellurium.—In the oldest records of the human race mention is made of gold, and like silver it was enumerated as an element of riches. Thus in Gen. xiii. 2, Abraham is said to have been very rich in cattle, in silver, and in gold. In Gen. ii. 11, 12, it is said to exist in the land of Havilah, which is encompassed by one of the rivers which proceeded from the garden of Eden; and its quality, as found there, is said to be good, thus implying a knowledge of different localities and qualities of the metal. Throughout the Old Testament there are frequent allusions to gold and to fine gold; and the process of the refiner is distinctly cited in Malachi iii. 2, and elsewhere referred to as the operation of trying or testing gold in the fire. In Exod. xxxix. are described many applications of gold similar to those of the present time. It was beaten into thin plates, cut into wires, and even woven with threads of linen for the sacerdotal robe of Aaron. It was fashioned into breastplates with chains at the ends of wreathen work of pure gold; and it was used as the setting of precious stones, some of the hardest of which, as the onyx stones, were engraved as signets. By other nations it was made into gods and idols, some of gigantic size. Aaron prepared a golden calf for the children of Israel, which Moses burned with fire and reduced to powder; an operation that might have been effected by first melting and beating it out into plates. In building the temple at Jerusalem the quantities of gold lavishly employed by Solomon for its furniture and decorations implied that it was largely collected, and that the ancients had access to mines of great extent and richness. In a later age, Atahualpa, the captured inca of Peru, agreed to bring together for his ransom, in the space of 2 months, articles of gold which should fill a room 22 feet long and 17 broad to the height of 9 feet. When this was done and the gold melted, it was found to amount to 1,326,539

*pesos de oro*. The commercial value of the *peso* Prescott computes as equivalent to \$11.67 of our money, making the sum total \$15,480,710. The source whence the Phoenicians and Israelites derived their immense supplies of gold was the land of Ophir, a region yet of uncertain locality. Once in 8 years the fleet of Solomon completed a voyage to it and back. Its other products beside gold brought back to Palestine (1 Kings x. 11 and 22), as ivory, spices, precious stones, ebony, peacocks, apes, and the almug or sandal wood, indicate its locality as in the tropics. It was probably either the East Indies or that part of the S. E. coast of Africa which is still called Sofala by the Arabs. The auriferous character of the desert steppes of Gobi was known in the time of Herodotus to the inhabitants about the sources of the Indus; and to this day are to be seen along the southern Ural the works of ancient mining operations, supposed to be those of the nomadic Scythians. Ethiopia and Nubia also were largely productive in gold; and the ancient mines discovered by Belzoni in the Zabara mountains are supposed to have furnished to the Pharaohs of Egypt their abundant supplies. In the history of the world there thus appear to have been many auriferous regions known at different times, which were productive like those of the present period. While the gold of the deposits continued abundant they were vigorously wrought, and each district furnished in its turn the principal share of the production of the world. In the time of the Romans, the precious metals were not so abundant, though rich deposits were worked along the foot of the Pyrénées, and in some of the provinces bordering the Alps. Strabo (B. iv. ch. 6, sec. 12) refers to the statement of Polybius that in his time the gold mines near Apulia were so productive that the value of gold was reduced one-third in Rome. Spain, too, had its deposits worked in ancient times along the Tagus; and the Athenians gathered their supplies of the metal from Thesaly and the island of Thasos. In the middle ages the art of working gold appears to have been little practised in the old world. The richness of the known mines was comparatively exhausted, and previous to the opening of the new fields following the discovery of America, the attention of the metallurgists was directed to vain attempts to transmute the baser into the precious metals. It was estimated that at the time of the discovery of America the whole amount of gold and silver in the old world was reduced to about £34,000,000, and that the supply no more than met the loss by wear. The enormous importation of gold and silver from the new world soon made up the deficiencies of the old mining regions, and, reducing the value of the metals in comparison with other products, caused mines which had before been successfully worked to be abandoned as unprofitable. From 1492 to 1500 the annual amount of gold brought into Europe from America is rated by Humboldt at £52,000; till 1519 gold

only was obtained. The same proportion may safely be extended to the year 1521, when Mexico was conquered, and the precious metals, but more especially silver, were obtained in vastly larger quantities. The mines of Potosi, discovered in 1545, gave a still greater preponderance to the production of silver, and no data are afforded for afterward distinguishing the relative proportions of the two metals. But in the first 300 years succeeding the discovery, the receipts of American gold were estimated at  $3\frac{1}{4}$  times the product of the mines of the old continent, and those of silver at 12 times the product of this metal. In the time of Queen Elizabeth, gold was obtained from the slates, where they are traversed by porphyries and other igneous rocks, at Leadhills in the south of Scotland; and toward the close of the last century, in the county of Wicklow in Ireland, about \$50,000 worth of gold was collected in two months. These deposits soon, however, proved unprofitable. The metal was in ancient times collected in Cornwall, and is known to exist in Devonshire; in Wales it is even now worked. Upon various rivers of Europe, as the Rhine, the Rhone, the Danube, the Reuss, and the Aar of Switzerland, the sands were known to be auriferous in places, but too poor to pay the expenses of working. At the foot of Monte Rosa in Piedmont, veins of auriferous pyrites in gneiss have long been worked at a moderate profit, though they barely yield 10 grains of gold to the hundred weight of ore. In lower Hungary veins containing gold disseminated in ores of sulphuret of silver are worked in a partially decomposed feldspar of the trachytic formation, and also in sienite and porphyritic greenstone; and gold is also extracted from auriferous pyrites of trap rocks of the most recent formation. The mines of Nagy-Ag and Zlatna on the frontier of Transylvania produce the alloy of tellurium and gold before referred to, and those of Kaprick in the same region the yellow sulphuret of arsenic. Beside gold, these Hungarian mines, worked by the Austrian government, produce copper, silver, mercury, antimony, lead, iron, and cobalt. The value of the annual product of gold is about \$880,000. In the Austrian provinces of Salzburg and Tyrol, at Bockstein and at Zell, gold is extracted from poorer ores than are elsewhere ever found profitable to work. The quartz gangue of the veins and the argillaceous slates of the walls contain auriferous pyrites, argentiferous mispickel, gray argentiferous copper, and sulphuret of silver. From these the gold is profitably extracted when it amounts to only from 6 to 15 parts in 1,000,000. At Zell it has been stated that the annual product of 50,000 quintals of ore has been only 85 marks of gold, or 4 parts in 1,000,000. The silver, though obtained in 6 or 7 times the quantity of the gold, is still less than half its value. At Reichenstein in Silesia a poor quality of arsenical pyrites, containing about 200 grains of gold in a ton weight, or 12 parts in 1,000,000, is worked by a new process of Prof. Platt-

ner, which will be described hereafter. The mines of the Asiatic slopes of the Ural extend along the secondary ridges of the chain in a N. and S. direction more than 400 miles. The formations are the metamorphic slates and granitic rocks, and contain veins, one of which is successfully worked at Berzovsk, near Ekaterinburg, by shafts and levels. The gangue is pyritiferous quartz and oxide of iron resulting from its decomposition, and the rock is a partially decomposed granite, the quartz remaining in angular grains, and the adjoining formations are talcose and chloritic slates. The description would answer perfectly well for many of the gold veins of Guilford co., N. C. All the other workings are of deposit mines. These are not only in the Ural district, where they have been worked for more than a century, but during the reign of Nicholas a region of southern and eastern Siberia, estimated to be as large as all of France, was found to be more rich in gold than that of the Ural. From the great E. and W. chain of the Altai mountains, which lie between Siberia and Mongolia, low ridges are directed toward the north into the governments of Tomsk and Yeniseisk, and these ridges of granitic and metamorphic rocks, like the others of the same class throughout the world, are the repositories of the precious metals. In 1848 this region produced the value of about \$11,000,000, while the product of the Ural districts for the same year was only about \$2,500,000. Until the discovery of the mines of California it made Russia the greatest gold-producing country of the world. Little is known of the other gold regions of the continent of Asia. The metal is possessed, and its deposits are no doubt worked to considerable extent, by all the principal nations; but except from the islands of the Indian archipelago little of it falls into the general circulation of the world. The river Pactolus of Asia Minor is supposed to have furnished from its golden sands the foundation of the wealth of Croesus. Borneo is supposed by Sir James Brooke to produce over £1,000,000 annually; and the mines of Sumatra and of Celebes and other regions of this part of the world are known to be rich. In Japan large quantities of gold have been obtained from washings and from ores mixed with copper. A Spanish writer of the 17th century stated that in his day the emperor's palace at Yeddo as well as many houses of the nobility were literally covered with plates of gold. In the beginning of the Dutch trade with Japan the annual export of the metal was £840,000, and in the course of 60 years the amount taken away by the Dutch alone was from £25,000,000 to £50,000,000. Africa, though believed to be one of the richest gold countries of the world, furnishes little of the metal to commerce. The annual amount is reckoned at from \$1,100,000 to \$1,500,000, of which about  $\frac{1}{2}$  is from S. Africa. This is nearly all fine dust, which must have been collected by careful washing from the alluvial deposits.—The American gold-producing dis-

tricts, in the southern continent, are in Brazil, Chili, and all those countries which lie north of the latter on the line of the Andes. As in Europe and Asia, it is the N. and S. ranges of hills of micaceous and talcose slates, quartz rocks, and granites, which produce this metal. In some instances, as in Peru and Chili, it is obtained from veins, commonly worked for other metals as well as gold; but almost universally it is a product of deposit mines. The yield since the early working of the mines has greatly fallen off, and especially since the commencement of the present century, as will be seen by reference to the articles BRAZIL, BOUVIA, &c.; and South America, from having been the first of the gold-producing countries in the world, has now fallen among those of least importance in this respect. Still it is well known that there are districts of great richness yet comparatively unworked, and which are likely long to continue so from their extreme unhealthiness and want of means of comfortable subsistence. Such is the country about the head waters of the Atrato, the Magdalena, and the Cauca. Similar causes, as well as the political condition of the countries of Central America, have prevented the development of their resources in this metal, which it is well known follows the Cordilleras northward. Upon the isthmus of Panama the recent discoveries of images of gold in the graves of the aborigines point to the existence of productive mines in Chiriqui, the localities of which are not now known. The images are cast, and though rude in their execution, are tolerably faithful imitations. Some of them are ornamented with wire work, which is attached by some method which workmen of the present day would find it difficult to practise, it being neither soldered nor inlaid, but apparently fused into the figures. The proportions of the figures are more faithful than is often found in the works of rude nations; and the style of some of them calls to mind the very similar executions of the Assyrians and ancient Egyptians. This is particularly the case with the figures of what appear to be idols. Among the animals are tigers, the forms of which are more oriental than American. The gold is very generally alloyed with copper; some of it indeed is only 8 carat gold, while in other samples the proportion is 23 carats. The gold of Mexico has been rather a secondary product of its argentiferous veins; but in Oaxaca are true gold veins in the micaceous slates and gneiss. The silver ores which contain the gold are often argentiferous galenas, the lead being the prevailing metal.—The southern portion of the gold region of the Appalachian chain appears to have been explored by some of the earliest Spanish adventurers; for in the Nacootchie valley of upper Georgia the ruins of ancient huts and utensils were uncovered a few years since in working the deposit mines, which evidently had been the work of civilized man, though they must have been there several centuries. It is supposed that they

belonged to De Soto's party, which penetrated from Florida to the Mississippi river in the 16th century. But until the early part of the present century the gold region of the southern states attracted no attention. Gold had been gathered to a small extent in various places along the ranges of hills on the E. side of the Appalachian chain, between the Potomac and the Coosa river of Alabama; but there was no regular market for its sale, and no account was kept of the quantities collected. These were altogether of deposit gold. In 1825 a gold vein was discovered by Mr. Barringer in Montgomery co., N. C., and attention was directed to this source, which in some instances proved highly productive; but this branch of mining was afterward most successfully prosecuted in Virginia, the coarse gold disseminated through the white quartz being more conspicuous than in the North Carolina veins. In the more broken country of the Carolinas and Georgia also the deposits of the streams were more attractive. In 1824 native gold began to appear in the mint at Philadelphia, and the receipts increased rapidly, so that in 5 or 6 years it constituted the chief portion of the supplies of this metal. Up to 1827 North Carolina had been the only state producing gold in notable quantities, and the aggregate amount from 1804 is estimated at about \$110,000. The first mint deposits from South Carolina were \$3,500 in 1839, and from Virginia \$2,500 in the same year. The first deposits of Georgia gold were in 1830 to the amount of \$312,000. In 1837 the production had become so great, that a branch mint was established by the government at Charlotte, N. C., and another at Dahlonega, Lumpkin co., Ga., both of which commenced operations the next year by coining the gold deposited by the miners. The annual production of the southern states has been estimated, until after the discovery of the California mines, at about \$1,000,000; but it has proved very irregular, and in some years has far exceeded this sum. The mint of Dahlonega has received in a single year \$600,000; but of late years the decline has become so great, that gold enough has not been offered to pay the expenses of the establishment, and that of Charlotte has not done much better. In 1857 and 1858 the abolition by congress of both institutions was generally looked for. But in 1858 and 1859 the method of working the mines by sluice washing, which has proved highly successful in California, was introduced at the mines of North Carolina and Georgia, inspiring by the results so far attained expectations of a renewed large production. The veins of the southern gold region are found in various rocks of a granitic character, and in the trap-pear rock called diorite, all which are often in a decomposed condition to the depth of 200 feet or more. They are also met with in a variety of slates, as talcose, micaceous, chloritic, and hornblende. In North Carolina a belt of slates several miles wide is traced through several counties on the E. side of another belt of granite

and W. of one of trap, in all which the veins are found. In South Carolina Prof. Lieber finds the rocks most auriferous to be clay and talcose slates, catawberite (a compound of talc and magnetic iron), specular iron schist, and itaberrite. None of the later formed rocks contain gold, and the mica slates and other older formations contain comparatively little. This is in accordance with the views of Murchison, who refers its position universally to veins in altered silurian slates, chiefly lower silurian, frequently near their junction with eruptive rocks; sometimes also, he adds, it is partially diffused through the body of rocks of igneous origin. The stratified rocks of the highest antiquity, as the oldest gneiss of Scandinavia and the N. W. coast of Scotland, and the Huronian and Laurentian rocks of Canada, do not contain it. The width of the whole gold range in the southern states is not yet defined; but in several places it is known to exceed 75 miles. In Georgia it appears to be divided into two belts, which are separated by unproductive metamorphic rocks. Steatite rocks are met with near the mines, and dikes of trap, granite, and porphyry are often found cutting the veins and sometimes disturbing their regularity. The course of the veins is by no means uniform; they run in various directions, and are often tortuous as well as displaced by "heaves." Their most common general bearing is N. E. and S. W., with a dip toward the N. W. Veins in which the quartz gangue is highly crystalline commonly abound in iron pyrites; as they are explored, pyritous copper is generally met with at some depth. In most instances the gold diminishes with the increase of copper, and the latter metal not proving abundant enough to pay expenses, the mines are at last abandoned. There are a few exceptions to this general statement, at least as to the failure of the gold. Veins of a granular quartz also are met with which contain no pyrites, and in which the gold is often disseminated in invisible particles—the quartz having nothing in its appearance to distinguish it from any other granular white quartz. Such veins are often of large size, and pay well near the surface; but they are sure to give out before reaching any great depth, the lodes themselves wedging out. The same kind of quartz also produces veins in other places remarkable for their abundance of coarse gold; and in these, pockets are occasionally struck, which seem for a time to promise inexhaustible supplies; but when worked out, though the gold obtained may amount to many thousand dollars in value, it is often insufficient to pay the expenses incurred before reaching another rich spot. The Dorn mine in Abbeville district, S. C., produced in one year (1852) gold of the value of \$202,216. The ore was highly ferruginous and silicious, and the gold was found among the layers of the vein in streaks and pockets of extraordinary richness. The production was limited to a very moderate depth below the surface. In Davidson co., N. C.,



a vein was opened in 1839, from which in the 3 succeeding years \$7,000 worth of gold was obtained associated with carbonates and phosphates of lead, native silver, argentiferous galena, blende, pyrites, manganese, and other ores. The mine has continued to be wrought, principally for silver. Beside these true veins, which are found cutting the strata in which they lie at various angles of dip and direction, and at times coinciding with them in these respects, there is another class of repositories of the precious metal, which are auriferous beds of slates, often decomposed, and sometimes containing pyrites and the gossan resulting from its decomposition. In Lumpkin and Habersham cos., Ga., these metalliferous beds have been worked like open quarries, and the gold in some instances has been collected with the rocker or the pan without recourse to crushing—worked in fact like deposit mines. They contain rich nests and fine gold most unequally diffused through the different layers among the slates. Some are perfectly barren in immediate contact with other streaks that may yield many dollars to the bushel; but they are so intimately mixed that all must be treated alike when worked on the large scale. The immense quantity in which these materials are obtained, and the ease with which they are quarried, sometimes render it an object to work them, though their yield is on the whole very small. When not pyritiferous, and a mill for stamping them is close at hand, the writer has found that they could be worked to profit when they produced from 4 to 5 cents a bushel. Reckoning the bushel at 100 lbs., this would be about 1.8 parts in 1,000,000; but where the material is hard quartz, and more especially if it is pyritiferous, the expenses of working may be estimated as quadrupled. By the application of sluice working, the soft materials can be worked with still greater economy. Quartz veins are after all the main dependence of the southern gold region; and if any may be regarded as permanent in their yield, it must be among those which are characterized by the presence of pyrites. Some of these veins have been worked many years with uniform good success. The Gold Hill mines in Cabarrus co., N. C., for the first 10 years after their discovery in 1848, produced an annual average of about \$100,000; and for 4 years preceding 1853, their product constituted more than  $\frac{1}{4}$  of all the gold coined at the Charlotte mint, which was then from \$850,000 to \$400,000; the workings had then reached the depth of 350 feet, and they have since continued productive even below 600 feet. The principal vein is vertical, consisting of quartz-like hornstone, of close, not honeycomb structure, in talcose slate, which dips at an angle of about 75° across the vein. Copper pyrites is found below water level, but is not regarded as important. Numerous veins are found lying in various directions in the slates of this vicinity. A mine a mile or two toward the south contains sulphu-

rets of zinc, lead, silver, iron, and copper, also carbonates and phosphates of lead, carbonate of iron, and native silver and gold; it has not, however, been found profitable to work. In Georgia a mine has been worked for about 18 years in Columbia co., which had proved when seen in 1855 regularly productive every day since operations were commenced upon it. In this the quartz is much honeycombed, contains little pyrites and a little galena. The workings in that time had not been carried below 70 feet; but there was no evidence of the gold failing in the bottom.—The veins throughout the gold regions are found of all sizes from a few inches to many feet. They are sometimes perfectly distinct from the walls, and at others cleave to them on one or both sides. The veinstones of the different mines vary in nature, and the gold itself possesses different values, as it is more or less alloyed with silver. Though quartz and pyrites are the common gangues, they present themselves in numerous forms; and some of these, which in one district are considered the richest in gold, prove in another entirely barren, though no more gold may be visible in the one case than in the other. A quartz of honeycomb or spongy structure and of a lively yellow or golden color, and passing from this to a rich reddish brown, is regarded throughout the mining regions as a good ore. The cellular texture is no doubt owing to the disappearance of iron pyrites, which once filled the cavities, and by its chemical decomposition was made removable by the percolation of water. The gold was thus set free from its true matrix and left behind in the cells of the quartz. The stains are those of the oxide of iron resulting from the decomposition of the pyrites. The deep red and brown ochres thus produced often form the richest portions of veins, and, by their pulverulent character, are the most easily treated for separating the fine gold they contain. The oxide of iron is often found in the form of hematite mixed with quartz and undecomposed pyrites. It may be of open structure or the most compact of this kind of iron ore. In both cases it may prove in some mines the richest gangue, and in others worthless. Where pyritous copper exists, malachite and ruby copper are sometimes met with in beautiful crystals in the cavities and upon the dark surface of the hematite. Brown spar (carbonate of iron) is another of the ferruginous gangues very common in many of the veins. Some veins possess extremely rich streaks, consisting of alternating thin layers of quartz and talcose slate, which may be taken out in sheets like boards, through the length of which along the edges the parallel structure of the layers is traced. Slate alone is sometimes the constituent of productive veins, that are only a few inches in thickness. The quality of the gold is rated by the price allowed for it at the mint. The coarse gold of the deposit mines is the proper representative of the quality of the gold of any district, because that obtained by the treatment of vein stuff may be

more or less thoroughly cleaned in its preparation. The deposit gold of each district has its own character, and its locality may often be recognized by its appearance. That in the vicinity of Dahlonega, Ga., is worth 98 cts. the dwt.; of Hart co., 98 cts.; of Carroll co., Ga., and Chesterfield district, S. C., \$1.02; N. line of Union co., Ga., 73 cts.; about Charlotte, N. C., \$1; and that of Burke co., N. C., only 50 cts. The gold appears to decrease in value toward the western margin of its field. The gold veins of Virginia extend through Fauquier, Culpepper, Louisa, Fluvanna, Buckingham, and a few other adjoining counties, and have been vigorously worked with the employment of large capital by Americans and by English companies. The returns at times have been very large, but for the most part they have been swallowed up in unprofitable operations, the veins proving extremely fluctuating in their yield; and though some of these still continue to be worked, their history on the whole is by no means favorable. Though gold has been found in Maryland, Pennsylvania, and Vermont, on the range of the Appalachian chain, it has proved insufficient to justify mining explorations, except over a limited area in Vermont during the year 1859. In Canada deposit gold was obtained to the extent of several thousand dollars on the Chaudière and its upper branches in 1850, '51, and '52.—The discoveries of gold in California in Feb. 1848, and in eastern Australia in Feb. 1851, are events in the history of the human race of similar importance to the discoveries of the wealth of Mexico and Peru in the days of Cortes and Pizarro. As this was made the agent for bringing about vast revolutions in society, and introducing civilization and Christianity into new continents, so these late discoveries have given a new impulse to the movements of population throughout the world; brought together people of strange nations; settled vast territories which before were a wilderness, and stimulated commerce to facilitating the means of intercourse between distant countries. For some years previous to this the whole annual production of the world had been only about \$20,000,000, of which Russia furnished more than one half. Six years afterward, the production of California alone was estimated for the year 1853 at about \$70,000,000; and this sum, owing to the additional supplies then beginning to pour in from Australia, represented not much more than half that of the world. The existence of gold in California has been known from the time of the expedition of Drake, 1577-'9, being particularly noticed by Hakluyt in his account of the region. The occurrence of gold upon the placers was noticed in a work upon Upper California published in Spain in 1690, by Loyola Cavello, at that time a priest at the mission of San José, bay of Francisco. Capt. Shelvoeke in 1721 speaks favorably of the appearance of the soil for gold, and of the probable richness of the country in metals. The

"Historico-Geographical Dictionary" of Antonio de Alcedo, 1786-'9, positively affirms the abundance of gold, even in lumps of 5 to 8 lbs. In 1837 a priest from California came to Guatemala, and by his representations induced Mr. Young Anderson, a Scotch gentleman, to attempt to enlist English capital for the purpose of exploring for gold in the vicinity of San Francisco. The scheme was regarded in England, when afterward proposed by Mr. Anderson, as Quixotic. The favorable appearance of the country for gold, and of Oregon also, were noticed by Prof. J. D. Dana, and recorded in his geological report of the country. In Hunt's "Merchants' Magazine" for April, 1847, is a very decided statement by Mr. Sloat respecting the richness of the country in gold, made from his observations there the two preceding years; and he confidently predicts that its mineral developments will greatly exceed in richness and variety the most sanguine expectations. In these years the Mormons connected with the army were known to have gathered some gold upon the banks of the streams, and the Mexicans and Indians also. A party of 8 Americans, 2 of them Mormons, collected, in Jan. 1848, a large amount of gold on Mormon island, Sacramento. On Feb. 9 the same party were at Sutter's mill on the American fork of the Sacramento, engaged in repairing the race, which had been damaged by the spring freshets, when the little daughter of the overseer, named Marshall, picked up in the race a lump of gold, and showed it to her father as a pretty stone. Though the overseer hastened to inform Capt. Sutter, the discovery did not immediately attract much attention; and the Mormons particularly sought to prevent the facts being made public. The Rev. O. S. Lyman, in a letter to the "American Journal of Science," of March, 1848, describing the quicksilver mines, adds at the close: "Gold has been found recently on the Sacramento near Sutter's Fort. It occurs in small masses in the sands of a new mill race, and is said to promise well." In August of that year Gov. Mason reported 4,000 men engaged in working gold, and a daily product of the value of \$80,000 to \$50,000. The earlier diggings were mostly deposits resting upon the upturned edges of argillaceous slates, the gold being found entangled in these under the sand and gravel, and also more or less mixed through the superficial layers. A large proportion was picked out by hand at many of the diggings, so abundant were the coarse pieces. The gold region is traced for 400 or 500 miles along the hills which lie west of the Sierra Nevada, and range N. and S. between this chain and the plains on the east of the Sacramento and San Joaquin rivers. These hills cover a tract of country in places 50 to 60 miles in width, and rise sometimes to the height of 4,000 feet. They are traversed by numerous streams, whose sources are in the Sierra Nevada. Subject to sudden and extreme freshets from the melting of the snows, and from the long continued rains of the wet season,

these streams excavate and sweep down the loosely aggregated rocks, and wear deep cañons and gulches, which extend toward the valleys of the Sacramento and San Joaquin. Thus it was the same agency which impressed this peculiar feature upon the topography of the region, and spread the gold from the veins in the hills through the ravines and down into the valleys. Even upon the elevated plains quite to the west of the hills gold is collected in strata of sand and clayey deposits, which cover the surface to the depth of 15 to 80 feet or more. The clay is often seen to be but partially decomposed slate, still retaining the structure of this rock, which was evidently the matrix of the gold. On the sides of the hills, in the superficial earth, are the deposits called the dry diggings produced by the disintegration of the gold-bearing rocks belonging to the immediate vicinity. The fluctuations of the seasons from long continued rains to extreme drought are unfavorable to the regular prosecution of gold mining. In the summer there is a deficiency of water for washing the sands; and in the wet season it is in such excess as greatly to interfere with the operations. Attention was early directed to the gold veins, and in 1851 regular quartz mining was commenced at Spring Hill in Amador co. In 1857 numerous mills, most complete and thorough in their construction, were in operation over a great part of the country; and mines were opened at greater depths than gold is often worked in other countries. A shaft of the Mount Hope mining company in Grass Valley was carried to the depth of 341 feet, reaching the vein at 350 feet, following its slope, and the richness of the veinstone at this depth gave full encouragement to the belief that these repositories were permanent and inexhaustible. Many other mines were worked from 150 to 300 feet in depth. The milling is necessarily suspended at most of them a considerable part of the year for want of water; even with the aid of that obtained from the mines the deficiency for the mills is seriously felt throughout the country; and extensive canals have been constructed and greater ones laid out to bring supplies from rivers many miles distant. The surface improvements made with reference to working the mines vie in extent and skill with those of the oldest mining regions; and the country already affords from its manufactories the machinery best adapted to its wants.—In Australia the existence of gold was known in the mountainous country lying back from the eastern coast of New South Wales colony several years before the discovery in Feb. 1851, which brought it into public notice. A despatch of the lieutenant-governor of the colony to the secretary of state, dated Sept. 2, 1840, enclosed a report from Count Strzelecki stating that he had discovered auriferous pyrites in the vale of Olwydd in 1839. The Rev. Mr. Clarke, a geologist, announced his discovery of the metal in the same colony in 1841. Sir Roderic I. Murchison, be-

tween this time and 1843, in his papers presented to the geological and geographical societies of London upon the Ural mountains, called attention to the similarity between these and the mountains of Australia; and in 1846 he addressed a letter to the geological society of Cornwall urging unemployed miners to emigrate to Australia and seek for gold. In 1847 he received from parties who had acted upon his suggestions, letters accompanied with specimens of gold they had found. In April, 1851, a gentleman named Hargraves, then lately from California, made known to the colonial government discoveries he had made in February 80 miles beyond Bathurst, which is 98 miles W. N. W. from Sydney. Researches were immediately prosecuted for the government by Mr. Hargraves, Mr. Stutchbury, the geological surveyor, and Mr. Clarke. The colonists at the same time engaged with the greatest activity in the explorations on their own account, numbering by the first of June more than 1,000 in the region of the discoveries. Within 8 months of this time the gold region was traced along the range of hills N. and S., and new discoveries were made of deposits surpassing all the rest in richness in the colony of Victoria, near the southern coast, 70 miles N. W. of Melbourne. In October there were 7,000 persons engaged in the new diggings at Ballarat near Mt. Buninyong, occupying less than a square mile in extent. The next month many of these were drawn off to the still richer deposits about Mt. Alexander in the same region, where it was estimated that 10,000 persons were then employed. In the month of December 68,800 oz. were transported to Melbourne from this locality, the value of which was then rated at £3 19s. 8d. per oz. The whole amount conveyed from the two localities from the first discovery at Ballarat, Sept. 30, to Dec. 31, was 134,835 oz.; the whole product of the colony was 345,146 oz. The immigration the next year of 104,000 more than doubled the population of Victoria; still richer diggings were discovered at Bendigo, and the total product of the colony for the year 1853 was estimated at 4,263,042 oz. The estimates made in London of the whole amount of gold exported from Victoria and New South Wales up to the close of 1852 gave for the former a total value of no less than £16,000,000, and for the latter £3,500,000; or for 15 months nearly 4 times what the annual production of the world was supposed to be 5 years previously. The amount reported as raised in the colony of Victoria in 1853 was 3,090,842 oz. The table of statistics at the close of this article exhibits the subsequent annual returns from both colonies. Victoria continued to furnish the great proportion of the exports. In 1856, according to the report of Gov. Sir H. Barkly, the total product of this colony was 3,538,527 oz., valued at £4 per oz. There were exported from the other Australian colonies the same year about 1,000,000 oz. The product of both colonies decreased annually from 1852; in 1855 that of Victoria commenced

increasing, which is attributed to the operations of vein-mining then successfully established, and producing in that year nearly  $\frac{1}{4}$  of the whole product. As in California, this is regarded as the future main dependence for keeping up the supplies. The gold region extends along the range of the Blue mountains, parallel with the eastern coast, from about lat.  $27^{\circ}$  to  $87^{\circ}$  S. The Victoria district near the southern coast appears to be upon another range or spurs of the main range further to the west. The occurrence of gold has also been reported near Adelaide, which is upon a still more western range in South Australia, near the southern coast, distant  $5^{\circ}$  of longitude from Melbourne. The geological formations, from the very crude reports which have been published, are evidently similar to those of other gold regions; the depth of the alluvial deposits, described as often being from 20 to 40 feet, indicates that powerful denuding forces must have been in action to have accumulated such a thickness of layers of sand, clay, and gravel in a mountainous region.—The exploration for gold is a simple process, which may be practised with little experience. The earth suspected to contain it is merely to be washed upon the blade of a shovel, taking care that the heavier particles are retained as the lighter are allowed to flow away. If a vein is to be tested, it may be done by beating the different stones found in it to dust and washing this with water upon the shovel; toward the last the gold, if any be present, will make its appearance around the edge of the stony particles. An iron pan is commonly used for this operation, which, when nearly filled with the material to be tested, is first stirred and then shaken just under the surface of the water of a brook or pond till the lighter portions flow away, when the process is carefully completed by frequently dipping, shaking, and pouring off. This hand washing is a rude way of collecting gold, which is practised by Mexicans, and was necessarily the only means employed by the California miners until more efficient apparatus could be introduced. The Mexicans excel in it, and use a wooden pan which they make for the purpose, very well adapted by its form to secure the gold. It is round, and shelves gently in, till near the centre it is suddenly depressed to form a sort of cup. In the southern states the operation is called panning. Mercury is conveniently employed to take up and secure the fine gold, which is most likely to escape unless thus gathered and held by the greater weight of the compound. This, collected at the close of the operation, is squeezed in a piece of linen or deer skin, through which the mercury in excess escapes, leaving the amalgam behind. By heating this upon the shovel or in the pan the mercury is volatilized, and the gold is left in its original shaped particles, plainly discernible in the coarse pieces, though these may all cake together. So powerful is the affinity of the gold and mercury, that however carefully the pan may have been

washed after the latter metal has been in it, the next panning will develop the presence of the mercury by its whitening all the particles of gold. Fire alone will thoroughly expel it. The slightest quantity of grease reaching the mercury will form a film over every particle of it, and effectually prevent its coming in contact and amalgamating with the gold. The Burke rocker of the southern states is a more efficient apparatus for collecting deposit gold. It is a canoe or cradle-shaped box about 6 feet long, upon two rockers, and set when in use with one end several inches higher than the other. The trough may be open, or covered with a cast iron plate perforated with holes, and in this case furnished beside with a drawer extending through its length, and secured at one end with a padlock. Across the bottom of the trough, or of the drawer when used, are fixed several low bars or partitions, 6 or 8 inches apart. It is placed where a stream of water can be led through a trough upon its upper end, and the gravel being thrown upon this by one man, while another keeps the machine rocking, the materials are continually swept through to the lower end, which being open admits their escape. The heavy sands are caught behind the bars, and mercury should be used above the upper ones to make more sure of retaining the finer particles of gold. There are various modifications of this machine. The "tom" is now commonly preferred to it, as this saves the labor of rocking. It is a cradle-formed box without rockers, crossed with transverse bars, and set under the end of a long trough through which a stream of water flows so swiftly as to sweep down the gravel thrown into it. This falls into the tom, and the gold is arrested by the bars and the mercury placed above them. The men throw out the large stones, and occasionally push along the clayey portions with the shovel or hand. When cleaned up after a day's work, the upper bar is removed, and as the stream of clean water flows through, the heavy particles are pushed along to the next bar, and this being removed they are still worked along with the hand till they fall into the pan placed below the end of the machine. In California an excellent system of washing deposits has been introduced, well calculated for passing through large quantities of material with the least water. This, called sluice-washing, is merely a long succession of troughs, placed one below another, into any portion of which the gravel may be shovelled. At any part "riffle" (ripple) bars may be laid across to catch the gold. Whenever water, charged with mud and gravel, rushing from a trough, falls into any basin with sufficient force to keep the pool "in a boil," the arrangement is favorable for catching the gold in the pool, while the earthy matters are washed away; the introduction of mercury makes the chance still better. The current should be proportional in force and quantity to the amount and density of the gravel introduced—little more than sufficient to keep the sediment in

motion, so as to prevent its damming; all excess beyond this involves increased loss of gold. Much fine gold that passes the bars may be arrested in the troughs by laying in the bottom a piece of baize or blanket. The dust entangled in the fibres of the wool is afterward collected by washing the cloths in a cistern of water kept for this use, its bottom covered with mercury. In Brazil tanned hides are used for the same purpose, being laid with the hairs directed against the course of the stream which flows over them. When removed from the water the rich sands are washed out of them into cisterns, and they are subjected to the amalgamation process with mercury; or, the skins being dried, they are beaten over a cloth placed to receive the particles which fall. The numerous mechanical contrivances invented since the discovery of the California mines are all based on the principles involved in the simple machines described. Many of them exhibit great ingenuity, but lack that facility of putting in operation and keeping in order, essential to the rude manner in which this process is conducted. Some are furnished with an iron pump, by which water is raised to the upper end of the machine. This, or a square box pump made by fitting and nailing together 4 long strips of board, is required at all wet workings to keep the pits made by digging the gravel free from water. But the most important improvement introduced in gold washing is that first applied in California of washing down the whole surface of hills wherever the soil, gravel, or decomposed rock shows by panning what the miners call the "color of gold," that is, any visible particles. It is often the case that gold in large quantities is so disseminated through bodies of decomposed rock as to render its separation by the old method unprofitable. To obtain this, the Californians applied a current of water under a great head, and directed through a hose provided with a nozzle. By this means the surface is excavated, the hills of crumbling rocky material are undermined and washed down, and the lighter portions flow away, leaving the greater part of the gold behind concentrated in the heavier sands. This method has rendered placers that were esteemed worthless of great value, and gives more importance to many abandoned gold fields in various parts of the world.—The materials obtained from gold veins demand more efficient machinery for their treatment; and mills are constructed to be run by steam or water power, to which the vein stuff is transported to be first crushed, and then subjected to various processes of grinding, washing, and amalgamating. Stamping is usually regarded as the most economical and efficient means of first reducing the stones, though a pair of cast iron crushing rollers are also used to good advantage, and many employ some of the complicated machines of more modern invention. The best stamp heads are solid blocks of the hardest cast iron, made with a face about 7 inches square and a length of 10

inches, beside the hollow shell which forms its upper end for the reception of the stamp leg—a long square stick of the strongest timber of the same size with the head. These, which weigh altogether about 800 lbs. (varying with the length of the leg), are small compared with the heavy stamps in use in California of 600 to 800 lbs. or more. A number of these are set in a frame to work side by side as they are raised in turn by cams attached to a revolving shaft in front of them. They beat upon a bed prepared by long stamping upon stones thrown in to form it, or upon cast iron anvils imbedded in an immense stick of timber. A current of water is generally allowed to flow under the stamps, and in California mercury is used with them. The water finds its way through the grates, or sheets of copper perforated with small holes, which form one side of the boxing around the lower end of the stamps. These holes are the only exit for the materials crushed by the stamps, and their size regulates the fineness of this work. A box is built in front of each set of grates and kept closely covered to prevent the scattering of the mud and water as these are projected through by the action of the stamps. In these boxes the coarse gold is commonly caught in a groove in their floor in front of the grata. The water flows out of the box by a wooden spout which discharges into an open trough; and in this a piece of baize is laid to secure more of the metal. In many mills the stuff is then conducted into a Chilean mill or an arrastre; and it is not unusual to employ the former without first passing the ore under the stamps. (See CHILIAN MILL, and ARRASTRE.) The arrastre is regarded with more favor in California than in the Atlantic states, and a single mill, the writer is informed, has as many as 62 employed, their number compensating for the slowness of their work, and this feature being considered especially suitable for most efficiently separating the metal. From the Chilean mill or arrastre the current conveying the sediments may be led through a succession of apparatus, of which there is the greatest variety, each intended to catch a portion of the gold carried past those behind. Mercury is used in most of them; and some ingenious machines are contrived in which the sediments are forced through a stratum of mercury, thus bringing every particle in contact with this fluid. Magnets are often made use of in the apparatus or separately for removing the particles of magnetic iron ore which accompany the gold in its progress through the machines. The multiplicity and complicated forms of the machines for collecting gold preclude an attempt to describe them. As examples of some of those which have been approved by long practice, and are still extensively used, may be cited the Tyrolean bowls and the shaking tables. The former are to be seen in Piedmont, set up in small mills along the elevated valley of Anzasca, where for many centuries they have served to extract the little gold yielded by the auriferous pyrites of that

region. The apparatus consists of a cast iron basin, fixed upon the top of a frame which serves as a table; within this is another basin of hard wood, its outside conforming to the inside of the larger one, but fortified with ribs of iron. The inner bowl is suspended upon a revolving spindle which passes up through the bottom of the larger bowl, and is thus made to rotate, its ribs nearly touching the inner surface of the outer bowl. The sediments are carried by a current of water through a spout into the inner bowl, which they fill, and flowing over and through the bottom are distributed upon the floor of mercury in the outer one; by the action of the ribs the whole is well mixed together, and the current then passes by a spout into another pair placed at a lower level, in which the action is repeated, and others may still succeed below. The shaking tables are swinging platforms, each one made of a single piece of plank 7 or 8 feet long, and as wide as can be procured, it being important in all floors for collecting gold to avoid introducing cracks or divisional joints. The plank should be 2 inches thick, and from a line across the middle it should be worked down till at one end it comes to an edge; and from the other end, which retains its full thickness, it should be worked down toward the middle line, till only about half an inch thickness is left. It is strengthened by sides of board about 6 inches high, and another similar strip is joined perfectly tight across the back or thin end. The table is then swung between 4 posts in a perfectly horizontal position by 4 rods or chains at least 8 feet long; and mercury is poured into the two divisions till they are more than half filled. A trough for conveying the sediments is then placed so as to discharge the current upon the back end directly into the greatest depth of mercury. Each table is now connected with a short crank upon a revolving shaft, so that with every turn it is made to vibrate forward and back. As it thus swings, the sediments swept over the surface of the mercury are shaken together to mix with it, and propelled in successive waves over the division across the middle upon the next surface of mercury, where the same action is repeated, and the current of mud and water escapes over the end. The weight of the mercury prevents its flowing over. All the particles are thus brought into close contact with the mercury, and no gold is likely to escape unless protected by some covering of earthy matter, or by combination with pyrites. By none of these processes can pyritous ores be made to give up all the gold they contain. However finely they are pulverized and thoroughly washed and amalgamated, every microscopic particle of pyrites carries off a portion of gold. The refuse heaps, called tailings, are at some mines subjected to repeated washings in hand rockers; and if a year or more pass between the operations while they are left exposed to the weather, they have been found to pay very well when washed for the 5th time. The reason of this is that the pyrites slowly de-

composes, and thus sets free more fine gold. From the intimacy of the mixture, from the fact that gold when associated with iron or copper pyrites, with blende, galena, and mispickel, is almost always invisible, and from other considerations, chemists generally incline to the opinion that the gold is sometimes not in a metallic state, but exists as a sulphuret combined with the other metallic sulphurets present. To effect its separation, then, this combination must be broken up; and the readiest way of accomplishing this is to subject the pyrites concentrated by washing to a roasting heat in a reverberatory furnace, by which the sulphur and iron are oxidized, the one escaping in sulphurous acid vapors, and the other remaining in the form of red oxide of iron, or ochre, and holding the fine particles of gold. This is the actual condition of the soft ochreous ores already described as being found in the veins. According to J. B. Boussingault, whose experiments of this nature are fully recorded in the *Annales des mines* (11th series, vol. i.), bisulphuret of iron should thus be completely converted into red oxide of iron, when the roasting process is well conducted, without producing a sensible quantity of sulphate of iron, and with a reduction of 83 per cent., or in practice 25 per cent., of the weight of the pure pyrites. The resulting oxide being then ground to fine powder in a mill like those used for grinding flour, the gold is readily obtained by the usual processes of separation. So thorough did M. Boussingault find this process that he recommends it as a very exact method of assaying such ores for gold, and especially for its being so readily applicable to large quantities; and as a mode of testing them in the small way he found it admitted of great accuracy. It is only necessary to roast some 40 or 50 grains, taking care to avoid a melting heat, and then wash the oxide obtained in a small glass tube. The gold soon collects at the bottom, and if there be only a small particle it is easily perceived. Objections have been brought against this treatment of gold ores by metallurgists of the Russian works at Ekaterinburg, who assert from their experiments that gold subjected to roasting, even in crucibles said to be hermetically sealed, is subjected to serious loss; and in open-air roasting the loss is sometimes equal to much the greater part of the gold present. This is especially the case when ingredients, such as sulphur, are present, which are volatilized by heat. Their vapors are supposed to carry off mechanically the fine particles of gold. The subject is one which should be carefully experimented upon by comparative trials in each instance; and after all it will become a question of comparative amount of loss by the two methods.—At most of the mills of California the pulverization of pyritous ores is carried to the extreme of fineness, by which the principal portion of the gold is obtained; at other mills the concentrated fine sands are treated chemically. At the Spring Hill mill the following process was in use in 1857. The pyritous

quartz is stamped with mercury, then passed on to shaking tables, and thence over a blanket slowly revolving as a band, at the rate of 10 feet in 7 minutes. The heavy sands collected from the tables, and by washing the blankets, are transferred into a Ohilian mill provided with wheels of 6 tons, and are ground for 24 hours with mercury. They are then removed to an iron barrel, revolving upon a horizontal axis, and containing several cannon balls and some mercury, and in this they are ground 24 hours longer. They are then washed, the amalgam is separated, and the residue which settles in water is returned to the Ohilian mill to go through the operation again with the blanket washings, &c., of the next day. If the gold exists chemically combined with the pyrites, as supposed, this operation, thorough as it is, is not conducted on so sound principles as the roasting, unless the opinion entertained by many be correct that gold is greatly wasted in roasting the ore. It must also involve a large loss of mercury from its exposure to oxidize in the stamp battery, and to unite with the sulphur to form a sulphuret. It may indeed be possible that the gold is set free from its combination by the mercury taking its sulphur, thus involving the loss of this portion of mercury.—Auriferous sulphurets have also been treated of late years at Reichenstein in Silesia by the chlorine process introduced by Prof. Plattner. After roasting, the oxide of iron and other residua are subjected in a proper vessel to a current of chlorine gas, which combines with the iron and gold. They are then soluble in water; and being dissolved, and a little hydrochloric acid added to prevent the precipitation of the iron, the gold is thrown down in a metallic state by a current of sulphuretted hydrogen. Arsenical pyrites was thus profitably treated which produced 200 grains of gold to the ton of ore, or one part in 78,400, the arsenic being also collected in the roasting. To be successfully applied, the process would require cheap supplies of sulphuric acid and common salt for generating the chlorine, and some chemical skill to direct the process. Some years since it was proposed in Russia to smelt the auriferous sands, concentrated first by washing, sufficient iron ores being also reduced with them for the melted cast iron to take up the gold, as in amalgamating it is taken up by mercury. The gold was then to be recovered either by melting the iron with a portion of lead, which has a strong affinity for the former and none for the latter metal; or the iron was to be dissolved by sulphuric acid, leaving the gold as insoluble residuum. Though feasible, it is not likely the process will ever be found economical. But in connection with the reduction of galena it may be advantageous in some localities to add auriferous ores, with the view of afterward recovering the gold by cupellation. In the *Annales de physique et de chimie*, 1886, and the *Annales des mines*, 1852, p. 426, are some interesting papers respecting the treatment of auriferous sulphurets by steam. Regnault in the former reports unfavorably

upon its use. M. E. Cuminage in the latter states that antimony and arsenic are thus completely expelled, provided sulphur is present to produce sulphuretted hydrogen. The apparatus is a tube containing the fine ore. While exposed to dull red heat steam is driven through it. Blende is thus converted into oxide of zinc without forming traces of sulphate. The processes in use at the Hungarian mines are fully described in the *Annales des mines*, 1888, pp. 63 to 150, and 218 to 368.—In considering the future sources of supply of gold and the quantities likely to be permanently produced, several features demand attention. The gold fields are limited to the areas occupied by the outcrop of the rocks which produce this metal. These are not worked where they pass beneath the formations of later age, nor are they found increasing in richness in depth, so as to render it probable that they will ever be sought for beyond the area of their outcrop. On the contrary, it is almost a universal rule, that it is only near the surface that gold is found in quantities remunerative to extract. Hence the sources cannot be considered inexhaustible; and under the energetic system of working introduced of late years there is reason to anticipate speedy exhaustion of the most available deposits now known. But then, by the improved modern processes, deposits are now made productive that in former times could not have been worked; and many old fields that have been regarded as already exhausted are likely to again furnish new supplies of the precious metal. The quartz veins of Australia alone, scattered over an area of more than 10,000 square miles, together with those of California, present sources of supply the importance of which is only recently appreciated, and which are decidedly more permanent in their nature than the superficial deposit mines. In all gold regions such veins are likely to be discovered and extensively worked. Thus it is, as new skill is applied to this branch of industry, that the field for its extension is enlarged, and no apprehension need be entertained of the final exhaustion of the supplies of gold sooner than of those of mineral coal, which also are included in fields of limited area.—In 1890 it was estimated that for the preceding 19 years the average annual production of the precious metals had fallen off about \$31,000,000 from what it had been before that time, the estimated product being as follows:

Countries.	Before 1870.	After 1870.
Europe and Asia.....	\$4,000,000	\$5,000,000
Indian archipelago.....	2,980,000	2,980,000
Africa.....	1,000,000	1,000,000
America.....	47,000,000	15,000,000
Total .....	\$54,980,000	\$33,980,000

By the estimate of M. Chevalier, in his work on money, the total amount of gold and silver existing in various forms in 1848 appears to have been £1,727,000,000, or \$3,500,000,000, of which  $\frac{1}{4}$  was supposed to be gold. The annual product of this metal from 1800 to 1850 had been £8,258,000. By other authorities the

whole amount of gold coin and bullion in Europe in 1847 was estimated to be about £350,000,000, and in the world in 1850 £600,000,000. The following table presents the supplies from the two great sources since the year 1847, though it must be observed that the official returns of exports given probably do not represent by full 10 per cent. the total additions made to the general stock of the world.

Year.	Californ.	Australia.			Total.
		N. S. Wales.	Victoria.	Total Australia.	
1848	£11,700	.....	.....	.....	£11,700
1849	1,612,000	.....	.....	.....	1,612,000
1850	5,000,000	.....	.....	.....	5,000,000
1851	8,250,000	2,485,266	2,485,777	2,907,143	9,157,143
1852	11,700,000	3,600,000	4,125,793	9,725,793	21,425,793
1853	12,500,000	1,781,000	8,464,589	10,445,589	22,945,589
1854	14,100,000	773,209	9,325,550	9,098,759	22,128,759
1855	18,400,000	308,250	11,808,980	11,518,230	24,918,230
1856	14,000,000	97,456	13,648,024	13,740,480	26,740,480
1857	13,110,000	83,198	11,671,101	11,764,299	24,874,299
1858	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....

The production of Russia for the years named is given below, the pood being equal to 86 lbs. avoirdupois :

Years.	Ural mts.		Years.	Poods.	
	Feeds.	Value.		Feeds.	Value.
1856	232	.....	1840	595	1,170,000
1857	223	.....	1841	631	1,263,000
All Russia.					
1858	318	£700,000	1842	950	1,900,000
1859	314	623,000	1843	1,393	2,544,000
1860	373	757,000	1844	1,241	2,482,000
1861	396	773,000	1845	1,286	2,773,000
1862	410	820,000	1846	1,780	3,480,000
1863	408	816,000	1847	1,585	3,550,000
1864	406	813,000	1848	2,000	4,000,000
1865	418	824,000	1849	2,050	4,100,000
1866	426	852,000	1850	2,175	4,350,000
1867	489	983,000	1851	2,373	4,544,000
1868	524	1,043,000	1852	2,120	4,240,000
1869	526	1,050,000	Mint receipts.		
			1853	1,457 7/8	3,215,000

The production of the United States for the year 1858 deposited in the mints and assay office was \$40,977,168 55, derived as follows: from California, \$40,591,140 88; from Oregon, \$9,181; and from the Atlantic states, \$376,846 67.

**GOLD-BEATING.** In the article *GILDING* mention is made of the antiquity of the use of gold leaf, and also of the extreme degree of tenuity to which it is reduced by the improved process of modern times. It is not known what were the methods in use by the Egyptians, Greeks, and Romans for obtaining the thin leaves they manufactured; but it is probable that they did not differ essentially from the simple processes now practised, which were brought to their present perfection by continued experience and the application of a moderate degree of skill. The earliest recorded notice of the mode of preparing the gold leaf is that of the German monk Theophilus, in the 9th century, from which it appears that parchment was used as a covering to the gold during the hammering, and the leaves were prevented from sticking by the application of red ochre or chalk. When the substance called gold-beaters' skin (French, *boudruche*) was first used for extending the process to the production of the finest qualities

of gold leaf is not known. This material, essential to the manufacture, is derived from the œcum of the ox, which, being well cleaned, is doubled together, the two mucous surfaces face to face, in which state they unite firmly. The membrane is then treated with solutions of alum, isinglass, white of eggs, &c., and sometimes with creosote, and being beaten between folds of paper to expel the grease, is finally pressed and dried. The leaves thus obtained, each  $5\frac{1}{2}$  inches square, are made up into moulds, each composed of 850 leaves. The œcum of 500 oxen are required for a single mould. By continued use for several months the thin membranes become dried and stiffened and unfit for use. To restore them, they are placed between sheets of paper wetted with white wine or vinegar and water, and are pressed down for some hours under weights. They are then placed between sheets of parchment, and are beaten sometimes for a whole day, after which they are rubbed over with calcined selenite or gypsum, and are then ready to be used again, though from their liability to absorb moisture they should always be dried before using.—Various qualities of gold are employed for gold leaf. The common coin answers a very good purpose, and different shades of color are obtained, as that is selected which contains a greater or less amount of silver in proportion to the copper in the alloy. Chemically pure gold makes leaves well adapted for gilding which is to be exposed to the weather, as they are less liable to tarnish or change color; these are remarkable for their property of adhering as they touch each other. Deep red colors are obtained by alloys of 12 to 16 grains of copper to the ounce of gold; silver, if added when too much copper is present, lessens the malleability of the alloy. Medium colors, as orange, lemon, &c., result from the alloy of 12 to 20 grains of silver and 6 to 8 of copper to the ounce; and pale colors from alloys of from 2 to not less than 20 pennyweights of silver to the ounce, without copper. The gold, being melted in a crucible with a little borax, is cast into ingots, commonly 8 or 4 inches long,  $\frac{1}{4}$  of an inch wide, and about  $\frac{1}{4}$  inch deep, and weighing about 1,000 grains each. The ingots are annealed in hot ashes to remove the grease derived from the moulds and increase the malleability of the metal. The French then forge the metal upon an anvil with small hammers, reducing its thickness to  $\frac{1}{4}$  of an inch, and at the same time exposing it to frequent annealings; but this is omitted by the English, who submit it at once to the lamination process, or rolling between two rollers of polished steel, which are adjusted so as to be brought successively nearer together. This operation, which formerly reduced the gold to a ribbon an inch wide and  $\frac{1}{16}$  of an inch thick, is by improved machinery now in use extended till the gold is reduced to a sheet a little more than  $\frac{1}{16}$  of an inch in thickness, an ounce making 10 feet in length by  $1\frac{1}{4}$  inches in width. The gold, again annealed, is next cut up into inch



squares, the weight of each being about 6 grains. About 150 of these pieces are piled alternately with leaves of fine calf skin vellum or of a tough paper manufactured in France for this purpose, each piece being placed in the middle of one of the leaves, which are 4 inches square. A number of extra leaves are added to the top and bottom of the pile, which when completed is called a tool or kutch. This is then slipped into a parchment case, open at two ends, and this into a similar case, so as to enclose the pack on all 4 sides. The pack is now placed upon a block of marble, set for an anvil, with a ledge around 8 sides of it, and a leather apron for the 4th side, which is held up by the workman, who proceeds to beat the pack. He wields a 16 lb. hammer, shifting it from one hand to the other without interfering with the regularity of the stroke, also occasionally turning the pack with the same dexterity. The hammer has a slightly convex face, which adds to its efficiency in spreading the gold, and the working of it is made much easier by the elasticity of the pack causing it to rebound. The pack is from time to time bent back and forth to overcome the adhesion between the gold and the vellum or paper; it is also rolled between the hands for the same purpose; and it is occasionally opened to examine the condition of the leaves and properly arrange them. In about 20 minutes' beating the gold is spread to the size of the leaves, covering 16 square inches in place of one inch. The pieces are then taken out, and each is cut into 4 square pieces, the original 150 pieces being thus increased to 600. These are again packed, this time in gold-beater's skin, again enclosed in parchment cases, and beaten with a smaller hammer, till they are extended to the size of the skins. This operation requires about 2 hours. More particular care is given now than before to folding the pack in order to loosen the leaves. When all the gold leaves have expanded to the full size, they are taken out and spread by the breath one by one upon a cushion, where each is cut into 4 squares by two sharp edges of cane fixed crosswise, and used by pressure downward. To this material the thin leaves do not adhere as they do to a steel blade. The squares are now 2,400 in number. These are once more packed, making 8 parcels, and beaten as before for 4 hours. This part of the process requires the most skill and care from the workman. The skins are the finest, about 5 inches square; the leaves are brought at the end of the operation to 3 inches, or from that to  $8\frac{1}{4}$  inches square. In this condition an ounce of gold is made to cover 100 square feet. It begins to transmit the rays of light, and, if slightly alloyed, the green rays particularly, but, if highly alloyed with silver, the pale violet rays also. The beating may be continued, and the gold be reduced to the thinness of the specimens noticed in GILDING; but there is no advantage gained in passing the average of the commercial gold leaf, which is about  $\frac{1}{135,000}$ , or that of the French, which is probably less than  $\frac{1}{330,000}$  of an inch

thick. The method of estimating this is by a simple calculation, obvious to any one who follows the above account of the process, or, knowing the weight of a cubic inch of gold, has the superficial area of the specimens and their weight given. The leaves are sorted after the final beating, each one being lifted by a delicate pair of whitewood pincers, and spread out by the breath upon a leather cushion. It is then trimmed down to about  $8\frac{1}{4}$  inches square by a square frame of sharp cane, and laid between the leaves of the book in which it is sold. Each book is made to contain 25 gold leaves, and these are prevented from adhering to the paper by an application to this of red ochre or red chalk.—Machinery for beating gold was exhibited in the London exhibition of 1851 from the United States and from France; and it is probable that this mode of manufacture will entirely supersede that by hand. Silver and copper are both beaten into leaves; but their value is not so great as to render it an object to reduce them to any thing like the tenuity of gold leaf, if their malleability admitted of its being done. Silver, though much less malleable than gold, may nevertheless be beaten out to cover a greater surface than the same weight of gold, in consequence of its greater bulk for the same weight.

GOLD COAST. See GUINEA.

GOLD FISH, or GOLDEN CARP (*Cyprinus auratus*, Linn.), a native of China, but introduced into Europe early in the 17th century. In China they are to be found in almost every house, and are kept either in porcelain vessels or in artificial ponds; wherever known they are prized for their beauty, elegant form, grace of motion, and docility; they are very easily kept alive in small vessels, if due attention be paid to changing the water daily. The usual color is bright orange above, lighter on the sides, and whitish beneath; the scales are large and striated; the pupils are black, and the iris silvery; the mouth is small and toothless; the dorsal fin is single, with the first two rays spinous. The colors vary exceedingly by domestication, and exhibit almost every variety of orange, purple, and silvery; the fins vary considerably, as regards the size of the dorsal and the number of the anals; triple tails are common, in which case the dorsal is frequently absent. The silver fish is a mere variety, and the dark colors are the marks of the young fish. It is found in many ponds in New England, bearing well the severity of the winters, and breeding in great numbers when protected from other fish. Gold fish form one of the most interesting ornaments of private gardens, and are seen everywhere in the basins of the fountains of large cities in the summer season; their price varies from 20 to 50 cents each, according to size and beauty; their food is chiefly infusorial animalcules, with bread when in confinement; their flesh is not esteemed as food. The intensity of the colors and several of their external characters are modified by their food, and the new characters are transmitted to the offspring. In artificial ponds they

are taught to come to the surface at the ringing of a bell. They will live in foul water, and a long time out of water on account of the loose structure of their gills; in ponds the spawn and young fish are often eaten by their larger comrades; their life may be prolonged to 20 or 30 years, and they will bear great extremes of heat and cold with impunity. In common with many fresh water fish, they are attacked and sometimes destroyed by a parasitic fungus, which springs from any diseased surface, and even from the healthy tissue of the gills.

**GOLDEN FLEECE.** See ARGONAUTS.

**GOLDEN FLEECE, ORDER OF THE** (Span. *el toison de oro*; Fr. *ordre de la toison d'or*), one of the oldest and most important of the orders of chivalry, founded at Bruges by Philip the Good, duke of Burgundy, on occasion of his marriage with the princess Isabella of Portugal, Jan. 10, 1430, and consecrated to the Virgin Mary and the apostle Andrew. The statutes of the order declare that it takes its name from the golden fleece which the Argonauts went in search of. The decoration of the grand master is a chain composed of alternate flints and rays of steel with the golden fleece fastened in the middle. The knights wear a golden fleece on a red ribbon. Its design was to maintain the honor of knight-hood and protect the church, and it was sanctioned by Pope Eugenius IV. in 1433 and by Leo X. in 1516. An article of the statutes (published at Lille, Nov. 30, 1431, in the French language) ordained that if the house of Burgundy should become extinct in the male line, the husband of the daughter and heir of the last lord should be grand master of the order. After the death of Charles the Bold (1477), the husband of his daughter and heir Mary, Maximilian I. of Austria, therefore inherited the grand mastership. During the war of the Spanish succession Charles III. (afterward the emperor Charles VI.) and Philip V., the contestants for the throne of Spain, both claimed this dignity. When the former left Spain he carried the archives of the order with him, and in 1713 celebrated its revival in Vienna. Spain protested against this at the congress of Cambrai in 1721, and it was decided by the treaty of Vienna in 1725 that the regents of both states should be permitted to confer the order with similar insignia, but that the members should be distinguished as knights of the Spanish or Austrian golden fleece. After the death of Charles VI., Maria Theresa in 1741 bestowed the office of grand master upon her husband Francis I., against which Philip V. of Spain protested in the electoral assembly at Vienna and at Frankfurt. At the peace of Aix la Chapelle in 1748, France, England, and Holland demanded that the schism should be composed; but as Ferdinand VI. of Spain declared that the order was inseparable from the Spanish crown, the dispute has remained unreconciled, and the order continues in two branches, neither of which recognizes the other. The statutes ordain that the knights shall recognize no other juris-

diction but an assembly of their order under the presidency of the grand master or of a knight authorized by him, and that they shall have precedency of all persons except those of royal blood. The number of knights, originally 24, was soon increased to 81, and in 1516 to 52. In 1851 the order consisted in Austria of 6 grand crosses, 20 commanders, and 161 knights. —See Reiffenberg, *Histoire de l'ordre de la toison d'or* (Brussels, 1830).

**GOLDEN NUMBER**, an ecclesiastical term for the number of years that have passed at a given date since the new moon fell on New Year's day. But in computing it, no account is taken of the reformation of the calendar; all the years are considered as Julian, of 365 $\frac{1}{4}$  days; and the Metonic cycle of 19 years is assumed to be rigorously exact. The golden number is the remainder arising from adding 1 to the date and dividing by 19. It has been in use since the 5th century B. C.

**GOLDEN ROD** (*solidago*, Linn.), the name of numerous plants, whose showy heads of flowers, waving like golden wands, make bright and gay the sides of roads, hills, and gravelly banks in the autumn. A supposed efficacy in the plants suggested to the early botanists the name *solidago*, from Lat. *solido*, to make firm. Although the general appearance of the racemed or else corymbed heads, which bear the florets, is diverse, yet the flowers themselves differ only from the asters in the pappus or silky hairs at the base of the fruit (seed) being in a single row. The genus is mostly North American, and Persoon out of 49 species gives only 8 which are indigenous to Europe and Asia, and 8 of these he calls arborescent forms. The most common European species is *S. virgaurea*, with a low, terete, pubescent stem, which branches above; the lower leaves are elliptical, somewhat hairy, acutely serrate, the flower heads in thyrsoid racemes. It grows in thickets and woods, and formerly was much used in medicine. Its principle is astringent and tonic; the leaves and flowers, however, were thought aperient. It occurs in the northern regions of America, but under very dissimilar forms. Of these, a dwarf kind, only a few inches high, with obovate or lanceolate, mostly entire leaves, and a few large flowers, is the variety which Dr. Bigelow calls *alpina*. It occurs in the alpine regions of New Hampshire, of Maine, and of New York, and on the shore of Lake Superior. A second distinct variety is *humilis* (Pursh), on the rocky banks of western Vermont, Lakes Huron and Superior, and northward; and a sub-variety with larger and broader leaves, the flower heads in ample, compound racemes, the flower rays occasionally white instead of yellow, is to be met with on gravelly banks of streams at the base of the White mountains in New Hampshire. A similar, but at the same time a distinct species, considered by Pursh as the *S. virgaurea*, is *S. thyrsoides* (Meyer), which occurs on the wooded sides of mountains from Maine to New York and northward. Perhaps the most inter-

esting species is the sweet golden rod (*S. odora*, Ait.), with a slender stem 2 to 3 feet high, often reclined; the leaves linear-lanceolate, entire, shining, covered with pellucid dots, which secrete a delicious anisate oil; the flower heads in racemes spreading in a one-sided panicle, the flower rays rather large and conspicuous. It may be occasionally found in rich shady woods. An essence distilled from the leaves has been used to relieve spasmodic pains. One of the earliest indications of the approach of autumn is in the flowers of *S. bicolor*, or white golden rod, a species scarcely like the others, with small white flowers of no especial beauty. Next comes into yellow bloom the tall Canadian golden rod (*S. Canadensis*), and following this, the gigantic golden rod (*S. gigantea*), and the tall golden rod (*S. altissima*), names singularly misapplied, as the altitude of both is not unusual. Afterward may be seen *S. arguta* and other species, until the lingering florets upon the downy golden rod (*S. nemoralis*) indicate the near approach of the cold. The golden rods generally affect dry and sterile soils, and range from alpine heights to the very margin of the sea, where may be seen *S. sempervirens*, with its large, thick, shining green leaves, and bold, large-rayed, and conspicuous yellow flowers, and the narrow-leaved (*S. tenuifolia*, Pursh), having very small, crowded heads of inconspicuous flowers. Several species are peculiar to the western states, as *S. Ohioensis* (Riddel) and *S. Riddellii* (Frank.), occurring in moist meadows and grassy prairies; and others, as *S. Drummondii* (Torr. and Gray), upon rocks, in common with more ordinary ones, indicating a wide distribution of the genus.

**GOLDFINCH** (*fringilla carduelis*, Linn.), one of the handsomest of the European *fringillida*, valued as a cage bird both for its beauty, its song, and its docility. It is about 5 inches long, with an extent of wings of 9 inches; the forehead and throat are crimson; the loreal space, top of the head, and a semicircular band on the upper neck black; the hind neck and back are umber brown, passing into ochre yellow on the rump; sides of breast and flanks paler, and white below; smaller wing coverts black, secondary rich yellow; most of the quills black with white tips, except the basal half of the outer webs, which are yellow; tail black, white tipped. The female is smaller, with less crimson, pure black, and bright colors in the plumage. Like all caged birds, the goldfinch sometimes shows considerable differences in color. It will pair and produce progeny with the green linnet. Its food consists of the seeds of the thistles, grasses, and herbaceous plants, which it seeks in small flocks. Its song, which is sweet and varied, usually begins in Great Britain about the end of March and continues until July; its flight is quick and buoyant, like that of the linnet. The nest is elaborately made of the usual materials, and lined with wool and hair; the eggs, about 5, are  $\frac{1}{2}$  of an inch long, of a bluish white color, with brown tinges and purplish spots. It remains in

Scotland through the winter, though great numbers perish in severe seasons. The goldfinch is easily caught and tamed, and may be taught the notes of other birds and many amusing tricks; it is a great favorite both in England and America as a cage bird; a fine male costs in England 6 or 7 shillings.—For the American goldfinches of the genus *chrysomitris* (Boie), see **YELLOW BIRD**.

**GOLDONI, CARLO**, the most celebrated comic author of Italy, called by his countrymen the Italian Molière, born in Venice in 1707, died in Paris in 1793. He passed his childhood in the midst of festivals and theatrical and operatic performances, with which his grandfather amused his leisure at a country seat near Venice. Comedies were his favorite reading, and at the age of 8 years he wrote a sort of comic drama, and at the age of 13 played female parts on the stage at Perugia. He studied philosophy under the Dominicans at Rimini, but deserted them to join a troop of comedians. His father, a practising physician at Chioggia, then undertook to teach him his own profession, but he soon solicited an exchange from medicine to law. At the age of 16 he was again transferred from legal studies at Venice to a scholarship in the papal college at Pavia, with the design of fitting him for the church. Within a year he became accomplished in music, dancing, and fencing, and learned a little of civil and canonical law. At the close of the 2d year he descended the Ticino and the Po with a company of wits and men of pleasure, and arriving at Chioggia was called upon to preach a sermon for an abbé of the place. His attempt met with brilliant success, and he returned to Pavia with a reputation for eloquence. In the 8d year of his scholarship, he composed a scandalous satire against the inhabitants of the town for an insult that they had offered to the students, and was expelled from the college. He resumed his studies of law, was graduated after divers mishaps at Padua, and in 1782 was admitted into the corps of advocates at Venice. He had already composed two comedies, and been manager of the theatre where they were produced, playing the principal parts himself; and while waiting for clients he published a successful volume, a medley of prose and verse and of serious and humorous pieces, under the title of *Esperienza del passato, l'astrologo dell' avvenire*, &c. He soon after repaired to Milan, where his comic opera the "Venetian Gondolier" was produced and applauded. While being driven from city to city by the events of war, he finished the tragedy of "Belisarius," which was played at Venice in 1784 with overwhelming success, maintaining itself through the season. His second tragedy, "Rosimond," failed in the following year. After furnishing other pieces with various success to different strolling companies, he married in 1786, and began to write for the company of Sacchi at Venice with the design of gradually reforming the Italian theatre. His aims were to substi-

tute human vices and follies for fantastic and frivolous adventures, to have the plays written in full instead of being only sketched by the author and in large part improvised by the actors, and to banish from the stage the traditional masks and costumes by which the Harlequin, Birghella, Pantalón, and other chief actors were distinguished. In 1789 he was appointed Genoese consul at Venice, but his income did not meet his expenses, and after two years he again resumed his wandering life, proceeding according to the exigencies of the war which had recommenced. At Rimini, the Austrian head-quarters, he was appointed director of the spectacles and amusements, and was liberally rewarded. He passed 4 months in Florence, visited Sienna, and was received with enthusiasm at Pisa, where he resumed for a short time the practice of law, at the same time sending to Sacchi at Venice some of his most successful comedies. In 1747 he returned from Pisa to Venice, determined to devote himself only to the stage and to complete the reform which he had begun. A violent warfare began between the partisans of the old and the new comedy, but at the close of the first season he had raised the theatre to which he was attached to a superiority over its rivals, and during the second year produced 16 new pieces of 8 acts each. The excessive labor injured his health, and to indemnify himself he began to publish his comedies, contesting the right to do so with the manager. In 1753 the first volume of a second edition appeared at Florence, and 1700 copies were at once subscribed for, though his opponents, prominent among whom was Carlo Gozzi, were exerting their greatest efforts against him. He was the author of 120 pieces, when in 1761 he was invited to Paris, where after writing 2 years for the Italian theatre he was attached to the court as instructor of the daughters of the king in the Italian language, and after 3 years more was awarded a pension. He continued to produce comedies at intervals, the most successful of which was the *Bourru bienfaisant*. His last literary labor was writing his memoirs (Paris, 1787), which were said by Gibbon to be more comical than his best comedies. In 1792 his pension with numerous others was suppressed by the convention, but it was restored through the influence of Joseph Chénier on the day preceding his death. The most striking characteristic of Goldoni as an author is his fertility, far superior to that of Molière, and scarcely surpassed by that of Calderon and Lope de Vega. The best of his pieces are those in the Venetian dialect, and his greatest merits are his theatrical skill, and the liveliness, piquancy, and humor with which he depicts the manners of all classes of society in Italy. Schlegel criticizes him as deficient in depth of characterization and in novelty and richness of invention. Critical biographies of him have been written by Giovanni (Milan, 1821), Carrer (Venice, 1824), Gavi (Milan, 1826), and Meneghezzi (Milan, 1827). The most complete

edition of his works is that which appeared in 44 vols. at Venice between 1788 and 1795.

GOLDSCHMIDT, HERMANN, a German painter and astronomer, born in Frankfort-on-the-Main, June 17, 1802. He studied painting at Munich under Schnorr and Cornelius, and in 1836 established himself in Paris, where he has since resided. Among the paintings which he has exhibited are the "Cumæan Sibyl" (1844), an "Offering to Venus" (1846), "Cleopatra" and a "View of Rome" (1849), the "Death of Romeo and Juliet" (1857), and several landscapes and portraits. In 1847 he began to devote himself to astronomy, and he has since discovered 10 asteroids, Lutetia (Nov. 15, 1852), Pomona (Oct. 26, 1854), Atalanta (Oct. 5, 1855), Harmonia (March 31, 1856), Daphne (May 22, 1856), Nysa (May 27, 1857), Eugenia (June 27, 1857), Doris and Pales (both on the same night, Sept. 19, 1857), and Europa (Feb. 4, 1858). He also pointed out more than 10,000 stars that were wanting in the celestial maps of the academy of Berlin, on which the most skilful astronomers have been laboring for half a century. It is remarkable that the amateur astronomer has made his discoveries with an ordinary spy-glass from his studio in an attic. The academy of sciences bestowed on him its grand astronomical prize.

GOLDSMITH, OLIVER, an English author, born in the hamlet of Pallas or Pallasmore, co. of Longford, Ireland, Nov. 10, 1728, died in London, April 4, 1774. His father, the Rev. Charles Goldsmith, was a clergyman of the established church, who, at the birth of his afterward renowned son, was struggling against want by farming some fields in his neighborhood, and by performing occasional services for the rector of an adjoining parish, by which he gained an aggregate income of £40 a year. Two years later he was presented to the living of Kilkenny West, and the family removed from their humble dwelling at Pallas to a comfortable house and farm near the village of Lissoy in Westmeath. Oliver's childhood gave no special indications of his future greatness. He received the elements of instruction at the village school from a teacher whose real character appears to have been as grotesque as are any of the after creations of his pupil's fancy. An attack of small pox from which young Goldsmith suffered while a child left its marks upon his naturally plain face, which, with a generally uninviting exterior, made his personal appearance especially unprepossessing. From the school of Lissoy he was removed to that of the Rev. Mr. Griffin in Roscommon, where he entered upon studies of a higher order, but was not distinguished for either aptness or diligence. An elder brother, Henry, afterward rector of Pallas, was then a student at the university; and several relatives having contributed to afford the same advantages to the younger brother, he was sent for preparation to a school at Athlone, and two years later to one at Edgeworthstown, but at neither of them did he display any prom-

ise of future eminence. He had a decided dislike for all exact studies, but relished the Latin poets, and was a good student of history. But if not distinguished with his teachers, he had become a favorite among his school-fellows. He had a thoughtless generosity of manner and a quick and sensitive temper, though his anger was only momentary, and he never cherished resentments. He was the leader of their sports and athletic amusements, and generally had a part in all mischievous pranks. Henry Goldsmith's success at college was highly gratifying to his father, especially when he distinguished himself at the examination, and obtained a scholarship, in 1748, which it was hoped would in due time be exchanged for a fellowship and lead to higher dignities and emoluments. But all these high expectations were blasted; for, while spending the ensuing vacation in the country, with the improvidence which seems to have belonged to the family, he married, and of course for ever abandoned college life. He then set up a school at Lissoy, and buried his talents and acquirements for the remainder of his life in his father's curacy. For this brother the poet seems to have entertained a constant and warm affection, as is evinced in several instances in his writings. In 1745 Oliver Goldsmith entered Trinity college, Dublin; not as a pensioner, as his brother had done, but as a sizar or poor scholar. At that time the position of that class of students was highly distasteful to young persons of proud and independent spirits. Their dress was peculiar, and designed to indicate their poverty, and they were required to perform many of the menial services of the institution. It was with the utmost reluctance that Goldsmith submitted to these humbling conditions, and while subject to them he was often "moody and desponding." His tutor, too, seems to have been specially unsuited, both by his tastes and temper, to profit his rather unpromising pupil. He was severe and passionate, and often followed insults with blows, and his devotion to the sciences led him to attempt to enforce attention to the studies which his pupil least affected. The death of his father, which occurred soon after he entered the university, rendered his situation still more embarrassing, and would have ended his college career had not some generous friends of the family contributed to his relief. As things were, he was often reduced to great straits, but between borrowing, pawning his books, and writing ballads, he contrived to keep his place. At one time we find him engaged in a town riot, from the consequences of which he escaped with a reproof; and again, having gained one of the inferior prizes of his class, he gave a supper and dance in his room to a number of young persons of both sexes, when his tutor, called by the sound of their revelry, suddenly broke in upon them, and scattering the guests, inflicted personal chastisement upon himself. This was followed by his hasty flight from college, with a desperate determination to go beyond sea, and an almost

equally hasty return, and a restoration to his former position. After this irregular sally upon the world he remained at college two years longer, giving proofs of latent talents in an occasional translation from the classics; though he never attained to eminence, owing partly to his indolence, and partly to the character and manners of his tutor. At length, on Feb. 27, 1749, he was admitted to the degree of bachelor of arts, and took his final leave of the university. He now returned home; but none of his friends were in circumstances to render him much assistance, and his career at college had inspired them with little confidence in his capacity to make his way in the world. After some months had been spent in aimless loiterings among his relatives, he was at length persuaded to prepare for the church. The selection seems to have been made simply because the preparation for that calling was less expensive than most others, and that success in it depended least on the character of the individual. The two years of his probation were spent in an idle and unsettled manner of life at Lissoy and Ballymahon, among the idlers at the village inns or in desultory reading. In due time he presented himself, arrayed in a fashionable dress, part of which consisted of a pair of scarlet breeches, to the bishop of Elphin for ordination, and, much to the credit of that worthy prelate, was rejected. Through the favor of the same kind friend to whom he was mainly indebted for the means of defraying the cost of his education—a maternal uncle-in-law, named Con-tarine—Goldsmith now obtained employment as tutor in a gentleman's family, where he remained a few months, when he quarrelled with the family, and so found himself once more a free man, and the owner of a larger sum of money than had ever before fallen to his lot. Without giving any notice of his movements to his friends, he purchased a good horse, and, with £30 in his pocket, sallied out upon the world. A few weeks after he returned again as destitute as he had been 6 months before. A large part of his money had been paid for a passage to America, but when the ship sailed he was enjoying himself with some friends in the country. It was next determined that he should try the legal profession, and, his generous uncle again affording him the means, he set out for London with £50, which he lost in gaming in Dublin; and after remaining secreted for some time, he again returned to his deeply chagrined, but still indulgent friends. He was next, toward the end of 1752, sent to Edinburgh to study medicine, in which he was more successful, though still evincing his reckless thriftlessness. Two winters were here devoted to hearing lectures, and the intervening vacation was given to summer rambles in the country. Near the end of his second term, burdened with debts and hunted by bailiffs, he escaped from Edinburgh and fled to the continent. He passed nearly a year at Leyden, ostensibly hearing lectures, but really devoting most of his time to pleasure, and then, after

selling his books and borrowing money from his friends, he set out for Paris. At the French capital he attended the chemical lectures of Rouelle, then in great reputation, and witnessed a brilliant concourse of the learned and gay of that renowned city. He evidently even then contemplated society with the eye of a philosopher, and predicted that a change was impending in the affairs of the nation. He also somehow gained access to some of the reigning celebrities of France, especially Voltaire, of whom he gave a striking account, professedly from observation of his manners and conversation. He remained in Paris but a little while, and then set out to make the tour of the continent. Taking parts of Germany and Switzerland in his way, he passed to Marseilles, and thence into Italy. How he supported himself in these wanderings is probably best told by himself, as it is generally supposed that it was from this period of his own history that he drew the materials of the story of the "Philosophical Vagabond" in the "Vicar of Wakefield." "I had some knowledge of music," he says, "with a tolerable voice, and now turned what was my amusement into a present means of subsistence. . . . Whenever I approached a peasant's house toward nightfall I played one of my most merry tunes, and that procured me not only a lodging, but subsistence for the next day." In Italy his musical powers no longer availed him, for, he said, every peasant was a better musician than himself; but he had acquired a habit of living by expedients, and here a new one presented itself. "In all the foreign universities and convents," he continues, "there are upon certain days philosophical theses maintained against any adventitious disputant, for which, if the champion maintain with any degree of dexterity, he can claim a gratuity in money, a dinner, and a bed for the night. In this manner, therefore, I fought my way toward England, walked along from city to city, examined mankind more nearly, and, if I may so express it, saw both sides of the picture." At Padua, where he remained some months, he took his medical degree. While here, too, he received intelligence of the decease of his benevolent uncle, whose friendship had survived all his own follies, and whose munificence was only equalled by his genial kindness. Deprived of this source of relief, he wrote to others of his relatives, but received no answers. Their faith and hopes in him were probably exhausted, and they might well consider themselves excused from supporting him in his wandering and thriftless habits. After two years had been spent in these vagrant rambles, early in 1756 he landed at Dover, friendless and penniless. How he made his way thence to the metropolis, in a country where neither his flute nor his philosophy could aid him, is not ascertained; it is only known that "in the middle of February he was wandering without friend or acquaintance, without the knowledge or comfort of one kind face, in the lonely, terrible London streets."

For 2 or 3 years after his coming to London his history is very obscure, though enough is known to show that his condition was sufficiently distressing. He was for some time an assistant to a chemist, and at another he practised medicine at Bankside in Southwark, acting at the same time as reader and corrector of the press for the novelist and publisher Samuel Richardson. He was also for awhile an usher in Dr. Milner's school at Peckham, a business which he seems to have especially hated, and yet the one to which he was occasionally compelled to resort for relief when all else failed him. It was while thus engaged that he accidentally met with Griffiths, the publisher of the "Monthly Review," by whom his services were engaged in the preparation of that publication. It was in this manner that he stumbled upon the profession of literature. Goldsmith now became the hired laborer of a shrewd and severe man of business. His daily employment was to write for the review under the direction of his employer, and, as if anticipating a better destiny in the future, he refused to lend his name to his productions. But the pages of the magazine very soon gave evidence of the acquisition that had been made to its contributors, and even the writer himself began to hope that his better days were at hand. But his path was still a rough one. A daily drudgery was required of him, alike irksome to his indolence and galling to his pride. These unhappy relations of the parties could not continue long, and accordingly, at the end of 5 months, the engagement was discontinued by mutual consent. But this transaction was one of great importance to Goldsmith, for it brought him into his appropriate sphere of life and action, and discovered to himself and others the secret of his power. He accordingly continued to write for a variety of periodicals, but only for present results. At the same time he seemed to be just on the point of forever abandoning the service of the muses. Through the influence of Dr. Milner he was appointed physician and surgeon to one of the East India company's factories on the coast of Coromandel, but for some unexplained reason the post was afterward given to another person. He then applied to the college of surgeons for the post of hospital mate, but failing to pass the necessary examination, was rejected. In 1759, between 2 and 3 years after his arrival in London, he issued his first acknowledged work, a duodecimo volume, entitled "An Inquiry into the Present State of Polite Literature in Europe." The tone of this volume was complaining, its temper sour, and its style quite unequal to its author's best productions; and, as it exposed a variety of manifest abuses in the trade of literature, it of course subjected him to a large share of censure. It however brought him into public notice, and gained him acquaintance with some of the principal men of letters of the day. In the same year he engaged in a weekly periodical called "The Bee," the first number of which appeared Oct. 6.

Though marked by great excellence, it met with little encouragement, and lived only 8 weeks. Soon after this he agreed with Mr. Newbery, the publisher of the daily "Public Ledger," to contribute some articles to that newspaper, and the famous "Chinese Letters," which Newbery republished a few months after under the title of "The Citizen of the World," were the result. These consist of a series of essays on society and manners, written in the assumed character of a Chinese philosopher resident in London, in a style of great purity, and in a vein of good-natured satire. This greatly improved both the reputation and the finances of the writer. He now emerged from his obscure garret, and took more eligible rooms in Fleet street, where he was often seen by his newly made acquaintances, among whom were Percy, Smollet, and Johnson, with whom he at once contracted a warm and lasting friendship. Burke, who had been at college with him, and Hogarth were also frequent visitors here; and here began an intimacy with Sir Joshua Reynolds, which only ended with Goldsmith's life. He was admitted to membership in the famous literary club at its institution, and lived to see many persons of distinction vainly suing for the same privilege. Goldsmith now continued his labors for the booksellers as a means of temporary subsistence. The principal work which he produced during this time was the "History of England, in a Series of Letters from a Nobleman to his Son," which, though a mere compilation from Hume, Rapin, Carte, and Kennet, was written with a fluency and grace which won for it the praise of being "the most finished and elegant summary of English history in the same compass that had been or was likely to be written." The impressions received during his tour on the continent still lived in his memory, and these he now reduced to due order and proportions, and gave to the world in the form of a poem. "The Traveller" was published near the end of 1764; and though its beauties were at once perceived by men of letters, it worked its way slowly into popularity. The "Vicar of Wakefield" was written simultaneously with "The Traveller," though not published till 1766. The copy had been sold 18 months before for £60, to save its author from the bailiffs. He next commenced writing for the stage, and in 1767 produced the "Good-Natured Man," which was acted at Covent Garden theatre the next winter. Though its success was only partial, it added to its author's reputation, and brought him the substantial reward of £500, and so enabled him to indulge his inclination for expensive living. The winter of 1768-'9 was spent by him in the Temple compiling a Roman history, which was published the next May, in 2 vols. 8vo. The next year he commenced the compilation of the "History of the Earth and Animated Nature," which was issued in 1774 in 8 vols. 8vo., for which he received 100 guineas each. In 1770 he published the "Deserted Village." The pop-

ularity of "The Traveller" had prepared the way for this poem, and its sale was instantaneous and immense; and in the course of 8 months the 5th edition had been printed, and a new poetical lustre shed around the name of its author. In 1771 he brought out another work on the "History of England," which in many parts was merely a reproduction of the former. It possesses the same merits and defects as the "Letters from a Nobleman to his Son," and was received with equal favor. Goldsmith's condition and circumstances had greatly improved with the growth of his literary reputation; but his style of living advanced even more rapidly than his resources, and his pecuniary embarrassments were daily growing upon him. The productions of his pen were in great demand, and commanded unusually large prices, but all were quite insufficient to meet his increased expenses. Honors were liberally showered upon him; but they for the most part came empty-handed, and as they constitute an expensive kind of luxuries, they rather increased than diminished his difficulties. When the royal academy of arts was instituted under the royal patronage, and Reynolds on the nomination of the king became its president, with the honors of knighthood, and Johnson professor of ancient literature, Goldsmith was complimented with the title of professor of history. This was highly flattering, but it was merely honorary, and brought no relief at the point where it was most needed. His labors for the booksellers continued to be his sole dependence; and as payments were commonly anticipated, he worked without hope, and lived upon the future. Beside his protracted labors upon his large compilations, and his nameless contributions to periodicals, he was steadily occupied with the preparation of small volumes, and in original poetical composition. His second comedy, "She Stoops to Conquer," was written early in 1772, but not acted till a year later. It was coldly received by Colman, the manager of Covent Garden, but strongly sustained by Goldsmith's literary and convivial associates. But its success, which was most flattering, was less owing to the favor of friends than to the intrinsic merits of the composition. A rich reward of fame greeted the successful author; and, what was more needed, its pecuniary results were highly satisfactory, though still far short of meeting his pressing necessities. In this state of his affairs, associated with the learned, the gay, and the opulent, on terms altogether honorable, he found his want of money increasing at a rate which rendered all hope of relief from his labors entirely desperate. Near the last of March, 1774, he returned from a brief visit to the country, purposing to resume his tasks and again to mingle with his convivial associations in the metropolis, but in truth to die. He found himself slightly indisposed by a local disorder, which readily yielded to treatment, but was followed by a low fever, under which the overtaxed powers of his system rapid-

ly gave way. He was in the 46th year of his age when he died. He was buried in Westminster abbey, where a monument was soon afterward erected to his memory by his literary associates, bearing a just though earnest tribute to his memory, prepared by Dr. Samuel Johnson, than whom he had no more steady admirer and faithful friend.—In the literary history of England, though there may be many greater men and greater scholars, there has arisen no better writer, whether elegance of style or purity of sentiment be considered. Of his works not already mentioned we may cite the "Memoirs of a Protestant condemned to the Gallies of France for his Religion," a translation from the French, and his first known publication (3 vols. 12mo., London, 1758); "Life of Voltaire," written in 1759 to accompany Purdon's translation of the *Henriade*, but published separately in a magazine; "Life of Richard Nash, Esq., of Bath" (Beau Nash), (8vo., 1762); "Edwin and Angelina" (or the "Hermits"), a poem (8vo., 1765); "A short English Grammar" (1766); "Beauties of English Poetry" (2 vols. 12mo., 1767); "Poems for Young Ladies" (12mo., 1767); "Life of Lord Bolingbroke," originally prefixed to a dissertation on the state of parties, and reprinted separately in 1770; "Life of Thomas Parnell," prefixed to an edition of his poems (8vo., 1770); "The Haunch of Venison, a Poem" (8vo., 1771); "The Grecian History" (2 vols. 8vo., 1774); "Retaliation, a Poem" (4to., 1774); a translation of Scarron's *Roman comique* (1774); "A Survey of Experimental Philosophy" (3 vols. 8vo., 1776). His essays were collected and reprinted during his lifetime. The first collection of his poems appeared in London in 1780 (2 vols. 12mo.), and editions have since been issued by Newell, with remarks on the actual scene of the "Deserted Village" (4to., 1811); Mitford, in the "Aldine Poets" (12mo., 1831); Bolton Corney (8vo., 1845); E. F. Blanchard, with illustrations by Birket Foster and others (8vo., London, 1858), &c. His miscellaneous works have been edited by S. Rose, with a memoir by Bishop Percy (4 vols. 8vo., 1801); with a memoir by Washington Irving (4 vols., Paris, 1825); by James Prior, with an elaborate biography (6 vols. 8vo., London, 1837); with a life and notes (4 vols. 12mo., 1845); by Peter Cunningham (4 vols. 8vo., 1855). The last two editions are the most complete and accurate that have appeared. Biographies of the poet have been written by Mitford, Prior, John Forster (1848, enlarged ed., 1854), and Irving (revised ed., 1849). Sketches of his life were published by Sir Walter Scott, in his "Lives of the Novelists," and Macaulay in the "Encyclopædia Britannica."

GOLF, a Scottish game, played with ball and club. The players number one or more on each side, and each is provided with a separate ball. The most skilful player is he who can land his ball in a given series of holes with the fewest strokes of his club. To place the ball in a

proper position for striking off is called "teeing," and the plot on which the game is played is termed the "putting ground." The balls now used are generally made of gutta percha.

GOLGOTHA. See CALVARY.

GOLIAD, a S. W. co. of Texas, intersected by the San Antonio river; area, about 800 sq. m.; pop. in 1858, 2,392, of whom 562 were slaves. The surface is generally level, and the soil deep and rich. The bottom lands are particularly fertile, producing cotton, sugar cane, Indian corn, and grass. Stock-raising is one of the chief occupations of the inhabitants. In 1850 the county produced 21,785 bushels of Indian corn. Goliad, the county seat, contains Aranama college (a Presbyterian institution), and the Paine female institute. Value of real estate in 1858, \$348,696. The San Antonio and Mexican Gulf railroad, when completed, will pass through the N. E. part of this county.

GOLIUS, JACOBUS, a Dutch orientalist, born at the Hague in 1596, died in Leyden, Sept. 28, 1667. He was educated at the university of Leyden. When only 21 years of age, he was appointed professor of Greek at Rochelle, but soon returned to Leyden, and applied himself to the study of the oriental languages. In 1622 he joined an embassy from the United Provinces to the emperor of Morocco, in order to perfect himself in the knowledge of Arabic. In 1624 he succeeded Erpenius as professor of Arabic at the university of Leyden, and in 1625 went to the East, travelling through the Levant, Syria, and Turkey, and in 1629 returned by way of Constantinople. Having during his absence been chosen professor of mathematics in the university of Leyden, he resided in that city till his death. He was a voluminous writer on oriental philology; his greatest work is his *Lexicon Arabico-Latinum* (fol., Leyden, 1658).

GOLOWNIN, VASILI, a Russian navigator, born in the government of Riazan, Russia, in 1776, died of cholera in St. Petersburg in 1831. He entered the imperial navy at an early age, and soon became noted for skill and courage. In 1807 he was commissioned by Alexander I. to make a survey of the Pacific coast of the empire. He sailed from Cronstadt in command of the sloop of war Diana, and was occupied till 1811 in examining the coasts of Kamtchatka and Russian America. In May, 1811, he sailed from Petropaulovsk in Kamtchatka to make a survey of the southern Kurile islands and the coast of Tartary. A few years before, in 1808, a Russian ambassador, named Resanoff, had endeavored to open an intercourse with Japan, but had been repulsed, as he thought, with insult. In retaliation, the ship of war which conveyed him to and from Japan plundered and burned a number of Japanese villages on the Kurile islands. These outrages excited the indignation of the Japanese, and when Golownin with his vessel appeared in their waters he was fired at and peremptorily ordered away. Being in want of water and provisions, he persisted in landing, and finally went on shore, July 11, with



2 officers, 4 seamen, and a Kurile interpreter, on the island of Kunashir. The Japanese received him in a friendly manner, apparently, but having enticed him and his companions into a castle garrisoned by 800 or 400 soldiers, they seized the Russians, and binding them tightly with cords, hurried them over to the large island of Yesso. The Diana, after some ineffectual attempts to rescue her commander, sailed away. Golownin and his companions were carried to Hakodadi, where they arrived Aug. 8, and were shut up in cages, and watched with great strictness, though in other respects they were treated with remarkable kindness. Toward the end of September they were removed to Matsmai, the capital of Yesso, where they were kept in cages in a prison erected expressly for them. Their only annoyance here, beside the restraint of confinement, was the perpetual cross-examination to which they were subjected by the Japanese authorities. This was so wearisome that the Russians frequently lost their patience, and told the Japanese to put them to death if they pleased, but to cease to torment them with questions. After some months they were allowed greater freedom, which they took advantage of in April, 1812, to escape from prison and make for the coast in hope of seizing a fishing boat and crossing over to Tartary. After wandering among forests and mountains for several days, they were recaptured, but were not punished at all for their attempt, though the governor mildly informed them that if they had succeeded it would have obliged him to kill himself. Finally, after an imprisonment of 2 years, 2 months, and 26 days, Golownin and the other Russians were given up in Nov. 1818, the authorities of Kamtschatka having sent the Diana to negotiate for their release, with explicit disavowals of the outrages that had followed the dismissal of the ambassador Resanoff. Golownin reached St. Petersburg, July 14, 1814, after an absence of 7 years. He was promoted, and had a pension granted him. He was afterward sent on an exploring expedition around the world in command of the sloop-of-war Kamtschatka, from which he returned in 1819, and of which he published a narrative (2 vols. 4to., St. Petersburg, 1822). He wrote in Russian, "Observations upon the Empire of Japan" (2 vols. 8vo., St. Petersburg, 1816), and an account of his adventures among the Japanese, both of which works have been translated into English under the title of "Memoirs of a Captivity in Japan during the Years 1811, '12, and '13, with Observations on the Country and the People" (2d ed., 8 vols. 8vo., London, 1824). Golownin was an accurate observer, and his narrative is one of the most interesting of the works upon Japan. He wrote also a book containing narratives of shipwrecks and disasters at sea.

GOMBO, also called OKRA and BENDU, the mucilaginous seeds of the shrub *Abelmoschus esculentus* (*Abelmoschus esculentus* of Wright and Arnott). The plant is cultivated in many parts of the world for the sake of the green pods,

which are used for thickening soups. The leaves also are useful for preparing emollient poultices.

GOMER, the eldest son of Japheth, son of Noah (Gen. x. 2). The descendants of Japheth form the northernmost of the 8 divisions of the Mosaic ethnology. As a nation, Gomer is also mentioned by Ezekiel (xxxviii.) among northern, probably Scythic, associations. The sons of Gomer were Ashkenaz, Riphath, and Togarmah, the first and last of whom are generally believed to designate Armenian tribes, while the name Riphath is compared with the Rhipsean or Ripsean mountains of the Greeks. The name Gomer is with much probability identified with the Kimmerii of Homer, *Æschylus*, and Herodotus, and through them with the Cimbrii of the Romans, and the Celtic Kymri (see CIMMERII, CIMRI, CELTÆ); and it strikingly coincides with these results of the latest ethnological criticisms that Josephus ("Antiquities," i. 6) had already rendered Gomer by Galatal, which designates Gauls or Celts. The ethnic name of Gimiri, which is found on cuneiform inscriptions of the time of Darius, apparently as the Semitic equivalent of the Aryan name Saka (Saccæ), and Gamir, the name of the ancestor of the Haikian kings of Armenia, according to national traditions, are also compared with the Gomer of the Scriptures.—See Rawlinson's 1st "Essay" to the 4th book of Herodotus, "On the Cimmerians of Herodotus and the Migrations of the Cymric Race."

GOMORRAH, that city of the plain which, according to Gen. xix., was destroyed with Sodom, on account of the wickedness of its inhabitants. It was situated S. of Sodom, and had a king named Birsha. The sites of the two cities are now covered by the waters of the Dead sea.

GONÇALVES, JOAQUIM ALFONSO, a Portuguese missionary to China, born in 1780, died in Macao, Oct. 3, 1841. He arrived in Macao in 1814, and passed there the remainder of his life. He was a learned sinologue, and published a Latin and a Portuguese grammar of the Chinese language, and a Chinese-Portuguese dictionary.

GONDAR, the capital of Amhara, one of the three principal kingdoms of Abyssinia, 21 m. N. E. of Lake Zana; lat. 12° 50' N., long. 37° 32' E.; pop. about 50,000. It stands on a lofty hill between two rivers, and from a distance seems more a forest than a city because of the number of trees which surround its buildings. The houses are built apart from one another, of red stone, and roofed with thatch. It contains numerous religious edifices, but its most remarkable structure is the royal palace, a spacious quadrangular castle, now partly in ruins, though once consisting of 4 stories. There are no shops or bazaars, and all goods for sale are exposed on mats in the public market place. It has manufactures of cotton, cutlery, &c., and the principal articles of trade are elephants' tusks, coffee, honey, wax, slaves, &c.

GONDOLA, a kind of barge, used on the canals which constitute the streets of Venice, and supplying the place of the carriages of other

cities. It is flat-bottomed, and usually about 80 feet long and 5 feet wide at the middle, terminating in 2 sharply pointed extremities, which are curved upward to a height of several feet. Near the centre is a small cabin with glazed windows and black curtains. In an ancient painting a flame-colored gondola is represented, and according to a chronicle of 890 the gondolas of the doges were ornamented with brilliant hangings and paintings; but for many centuries they have been painted black, and the cabins covered with black hangings. They are propelled by two gondoliers or boatmen, one at the prow and the other at the stern, who were formerly an important and interesting part of the population, numbering several thousands, and noted for their peculiar musical recitation of long passages from Tasso and Ariosto. The two gondoliers alternated, each singing a stanza, and thus chanting together favorite selections, as the death of Clorinda or the palace of Armida. Since the fall of the republic, according to Lord Byron,

In Venice Tasso's echoes are no more,  
And silent rows the songless gondolier;

but according to other authorities, the chant may still be heard every night on the water, and it is said that there are gondoliers who know by heart the whole of Tasso, while some repeat the stanzas of Ariosto. A sort of poetical challenge is in vogue among them, and he who cannot take up the subject by continuing it is held as vanquished. Editions of Tasso have been printed with the original in one column, and the variations introduced by the Venetian boatmen in another, the latter being called the *Canto alla barcarola*.

GONG, the *tam-tam* of the Chinese, a sonorous instrument, resembling in form a tambourine, used by rapidly beating its surface with a stick like a pestle covered with leather. The composition of the alloy of which it is made was found by Klaproth to be copper 78 parts and tin 23 parts. (See BRONZE.) It is used in the hotels of the United States to summon the guests to the table.

GONGORA, LUIS DE, a Spanish poet, born in Cordova, Jan. 11, 1561, died in the same city, May 23, 1627. He was the son of a distinguished lawyer, and was educated at Salamanca for his father's profession, which however he neglected and abandoned, and devoted himself to poetry. He lived in his native city poor and obscure till the age of 48, when he repaired to the court at Valladolid, where, having entered holy orders, he was made chaplain to the king. His health failing, he returned to Cordova to die. His early poetry, consisting of ballads and odes, is remarkable for vigor and simplicity, but later in life he adopted an affected, obscure, and highly metaphysical style, which for a time became fashionable in Spain, and was imitated by a large school of succeeding poets. It is known as the *estilo culto*, or cultivated style, and one of its most marked features was the use of obsolete and foreign words and

of new and forced constructions. So unintelligible were the works of Gongora that even in his own lifetime commentaries were written to explain them. Within 20 years after his death, Coronel, a poet of the same school, published a commentary 1,500 pages long on the works of Gongora (8 vols. 4to., Madrid, 1636-'46).

GONIOMETER (Gr. *gonia*, an angle, and *metron*, a measure), an instrument for measuring the angles of crystals. Two kinds of goniometers are in use, one designed to measure the angles by direct application of the instrument to the faces of the crystal, and the other by the arc through which the crystal must be turned for two adjoining faces to reflect in succession the same object to the eye. The first and simplest form is the common, or Hatty's goniometer. It is a graduated semicircular arc with a fixed and a movable radius, between which the crystal is placed, each radius being made to coincide with the plane of one of its faces. The angle of their opening may then be read off on the arc. This instrument cannot be depended upon for nicety of measurement. The reflecting goniometer was invented by Dr. Wollaston, and several modified forms of it have been introduced by others. It requires for its use crystals with clear faces, that can distinctly reflect the image of a dark line across a clear light, as the bar of a window sash. The instrument is made with great precision, and its graduated arc is furnished with a vernier, by which the degrees are divided into minutes. The French goniometer of Adelman combines the principles of both the common and reflecting instruments, and is much less expensive than Wollaston's.

GONSALVO DE CORDOVA, or GONZALO FERNANDEZ DE CORDOVA, surnamed the Great Captain, a Spanish general, born at Montilla, near Cordova, March 16, 1458, died in Granada, Dec. 2, 1515. His family name was Aguilar, but his ancestors rendered such services at the conquest of Cordova in 1286, that St. Ferdinand, king of Castile, permitted them to assume the name of that city. At the time of Gonsalvo's birth his family had great influence in Cordova, and were the chiefs of a powerful faction, the party opposed to which was headed by the house of Cabra. The feud between these factions led frequently to sanguinary conflicts in the streets; and after the death of Gonsalvo's father, the partisans of the house of Aguilar, deprived of their natural leader, carried their infant chief with them in their fights, and thus, as Prescott remarks: "Gonsalvo may be said to have been literally nursed amid the din of battle." At the court of Ferdinand and Isabella, to which he repaired in early youth, Gonsalvo attracted much attention by his personal beauty, his skill in knightly exercises, and the profuse magnificence of his apparel and style of living. He was popularly termed *el principe de los caballeros*, the prince of cavaliers. During the war with Portugal which began in 1475 he served under the banner of the grand master of Santiago, and made a signal display of valor at

the battle of Albuera, where the splendor of his armor attracted general attention and made him a special mark for the lances of the Portuguese knights. But it was in the war with the Moors, which began with the surprise of Zahara in 1481, and ended with the surrender of Granada in 1492, that the military genius of Gonsalvo was first conspicuously exhibited on a great theatre. He distinguished himself at the sieges of Tájara, Illora, and Monte Frio, at the last place heading the assault, and being the first to mount the walls. It is sufficient proof of the high position he had attained in the favor and esteem of Ferdinand that he was selected, in conjunction with the king's secretary, to conduct the difficult and dangerous secret negotiation with the Moorish monarch, Abdallah or Boabdil, which resulted in the capitulation of Granada, and the termination of the Moorish power in Spain. After the war, Gonsalvo remained at court in high favor with Ferdinand and Isabella; and when the Spanish monarchs, in 1495, determined to send an army to Naples to assist their kinsman Ferdinand II. in recovering his kingdom from the French, by whom it had just been conquered, Isabella recommended him to her husband as the most suitable person to command it. "She knew," says Prescott, "that he possessed the qualities essential to success in a new and difficult enterprise—courage, constancy, singular prudence, dexterity in negotiation, and inexhaustible fertility of resource." Gonsalvo was accordingly appointed, and embarking for Sicily with a small squadron, reached Messina, May 24, 1495. His achievements speedily justified the confidence of Isabella. At the outset his force amounted to only 600 horse and 1,500 foot, and a small body of Neapolitan militia. In his first battle at Seminara, in which he had engaged against his own judgment, in compliance with the urgent demands of the Neapolitan king and his principal officers, he was defeated, but his desperate valor in charging the triumphant French at the head of his Spanish lances saved the army from total destruction and King Ferdinand from capture. His Neapolitan allies had fled at the first onset of the enemy. Thenceforth Gonsalvo followed his own genius, heedless of advice, and was uniformly successful. "Tower and town, as he advanced, went down before him," and by the end of 1496 the French, who a year before had possessed the whole kingdom, yielded up their last fortress, and withdrew to their own country. It was in this campaign, on his arrival at the camp of Atella, after a series of brilliant exploits, that he was hailed by the soldiers as *El Gran Capitán*, the Great Captain, the name by which he was ever afterward familiarly known throughout Europe. After driving the French from Naples, Gonsalvo, at the request of the pope, laid siege to Ostia, the port of Rome, which was held by a formidable band of freebooters. The place was carried by storm, and the grateful Romans received the Great Captain, a few days after, on his entry into their city, with all

the pomp of an ancient triumph. When he reached the Vatican, the cardinals, seated under a canopy of state, rose to receive him, and the pope presented him with the golden rose, the highest token of the approbation of the holy see. On his return to Naples the king gave him the title of duke of St. Angelo, with an estate containing 8,000 vassals. In Spain, where he arrived in Aug. 1498, he was received with universal enthusiasm, and Ferdinand publicly said that Gonsalvo's achievements in Italy reflected more lustre on his crown than the conquest of Granada. In the beginning of 1500 he was called into the field to suppress a sudden insurrection of the Moors of the Alpuxarras, in which he displayed his usual promptness and energy. In May of the same year he sailed from Malaga in command of an army of 4,600 men, ostensibly intended to operate against the Turks, but in reality designed to protect Naples, which the French were preparing to invade a second time with much greater forces than before. In September, Gonsalvo, in conjunction with a Venetian fleet, laid siege to the almost impregnable fortress of St. George in Cephalonia, which was garrisoned by a strong body of Turkish veterans. After a long and stirring siege, which attracted the attention of all Christendom, the place was carried by assault in Jan. 1501. Gonsalvo returned to Sicily, where he was waited on by an embassy from the Venetian senate bringing him magnificent presents. His name also was enrolled in the golden book of noblemen of Venice. Meanwhile, by a secret treaty, Louis XII. of France and Ferdinand of Spain had agreed to divide Naples between them, France taking the northern part, and Spain the southern, consisting of Apulia and Calabria. Gonsalvo was appointed lieutenant-general of the Spanish portion, which he accordingly overran and conquered in less than a month. The city of Tarento alone held out. The Neapolitan king had placed there his eldest son, the duke of Calabria, and had garrisoned the city, which was considered the strongest in his dominions, with a large body of troops. After a long siege it capitulated, March 1, 1502, Gonsalvo swearing on the sacrament that the Neapolitan prince should be at liberty to go with his followers where he pleased. The prince was accordingly suffered to depart, but shortly after the surrender positive orders arrived from King Ferdinand instructing Gonsalvo on no account to suffer the prince to escape. Gonsalvo accordingly sent in pursuit of him, and he was captured and taken prisoner to Spain, where he was kindly treated, but detained till his death in 1550. The Spanish historians palliate this act of perfidy by stating that the Neapolitan prince privately wrote to Gonsalvo urging his own arrest, for the reason that he preferred to reside in Spain rather than in France, whither his father wished him to go, and he could not with decency openly oppose his father's wishes. The French and Spaniards speedily quarrelled

about their boundaries in Naples, and in July, 1502, their dispute broke into open hostilities. Gonsalvo, whose force, which had not received any reinforcements from Spain, was much inferior to the French, threw himself into the fortified seaport of Barletta on the Adriatic. Here, from July, 1502, to April, 1503, he sustained, with indomitable constancy, and amid extraordinary sufferings, one of the most memorable sieges in history, conducted by the duke of Nemours, the chevalier Bayard, the sire de la Palice, and many others of the most illustrious chivalry of France. Having at length received by sea a small reinforcement, the Great Captain, on April, 28, broke forth from Barletta and gave battle to the French. He defeated them, with the slaughter of half their army, the loss of all their artillery and baggage, and most of their colors. The duke of Nemours, Chaudieu, the commander of the French infantry, and several other distinguished officers, were killed. This victory decided the war. The citizens of Naples promptly sent to Gonsalvo the keys of their city, and in a few weeks all the fortresses held by the French were taken or surrendered, with the exception of Gaëta, a place of great strength, into which the remnant of the French army had thrown themselves under command of Ives d'Allègre, one of the best of the French generals. A long siege ensued, which gave time to Louis XII. to despatch into Italy one of the finest armies that France had ever sent into the field. Gonsalvo met the French on the Garigliano, near Gaëta, defeated them in several encounters, and on Dec. 29, 1503, routed them totally with great slaughter. Bayard, who had 8 horses killed under him in the battle, was taken prisoner, but was rescued by a gallant charge of French knights. This defeat, which diffused general consternation through France, put an end to the attempt to conquer Naples. Gaëta surrendered Jan. 1, 1504, and by a treaty, Feb. 11, peace was restored between France and Spain, the latter power retaining Naples. This terminated the military career of Gonsalvo, in the course of which, says Prescott, "with an insignificant force, we shall see the kingdom of Naples conquered, and the best generals and armies of France annihilated; an important innovation effected in military science; the art of mining, if not invented, carried to unprecedented perfection; a thorough reform introduced in the arms and discipline of the Spanish soldier; and the organization completed of that valiant infantry, which is honestly eulogized by a French writer as irresistible in attack, and impossible to rout, and which carried the banners of Spain victorious for more than a century over the most distant parts of Europe." Gonsalvo remained in Naples, ruling the kingdom as viceroy till 1507, when Ferdinand, apparently without reason, suspecting that he meant to make himself an independent sovereign, recalled him to Spain. The Great Captain cheerfully obeyed, and, in company with Ferdinand himself and his young queen, embarked on

board the royal fleet. At the port of Savona they met the French monarch, who was waiting to receive them with all his court. Gonsalvo was received with the highest distinction by his old enemies, and was admitted to sup with the 8 sovereigns, an honor which Guicciardini, the Italian historian, pronounces more glorious than all his victories. Soon after his return to Spain he retired to his estates near Loja, where he lived in great magnificence, though somewhat neglected by the suspicious Ferdinand. In 1512 the French again made head in Italy, and in alarm Ferdinand called upon Gonsalvo to take command of an army for the protection of Naples. Such was the popularity of the Great Captain, that when it became known that he was to command, nearly all the nobles of Spain volunteered for the Italian war. This enthusiasm so augmented Ferdinand's distrust that he countermanded his orders, and directed Gonsalvo to disband his levies. The Great Captain obeyed, though he understood the motive of the king, and was deeply wounded by the implied distrust of his fidelity. He soothed the indignant murmurs of the troops, and to reimburse the expenses they had personally incurred, distributed among them from his own estate the immense sum of 100,000 ducats. "Never stint your hand," said he to his steward, who remonstrated; "there is no mode of enjoying one's property like giving it away." Three years later Gonsalvo was attacked by a quartan fever, and removed to his palace in Granada, in hopes that the climate of that city would benefit his health; but he died shortly after his arrival there. His death diffused sorrow throughout Spain. The king and court went into mourning, and funeral services were performed in his honor in all the principal churches of the kingdom. His remains were laid in a sumptuous mausoleum in a chapel of the church of St. Geronimo at Granada, where a hundred banners and royal pennons waved above them until late in the 17th century.

GONZAGA, THOMAS ANTONIO COSTA DE, a Brazilian poet, called the Portuguese Anacreon, born in Porto in 1747, died in Mozambique in 1798. After studying 5 years in the university of Coimbra, Portugal, he returned in 1768 to Brazil to enter on an official career. He held the dignity of *ouvidor* at Villa Rica, and in 1788 was about to marry a young lady of distinguished beauty when he became involved in the conspiracy of Alvarenga Peixoto, Claudio Manoel, and others, and was arrested and confined in the dungeons of Rio Janeiro. The court condemned him to perpetual exile in an island on the coast of eastern Africa, which by special favor was commuted to 10 years' banishment to Mozambique. He left Brazil in 1798, and was attacked by fever soon after reaching Africa, from which he recovered only to fall into madness from the effect of the burning climate. The most interesting of his poems were composed during his captivity, and celebrate in

mournful and tender verses the object of his love under the name of Marilia. They are popular alike in Brazil and Portugal, and have been often reprinted. In grace, tenderness, purity of style, and harmony of verse, Gonzaga ranks among the first Portuguese poets.

GONZALES, a S. co. of Texas, intersected by the Guadalupe river; area, 1,140 sq. m.; pop. in 1858, 7,044, of whom 2,811 were slaves. It has an undulating surface, about  $\frac{1}{2}$  of which is covered with ash, post-oak, and other timber. The soil is fertile, consisting chiefly of a black loam, easily cultivated, and suitable for cotton, grain, and pasturage. In 1850 it produced 87,-875 bushels of Indian corn, 9,418 of sweet potatoes, and 1,271 bales of cotton. Value of real estate in 1858, \$1,862,646. There are rich deposits of coal and iron. Gonzales, the county seat, contains Guadalupe college, and was a theatre of events connected with the Texan revolution.

GONZALO DE BEROEO, JUAN, the most ancient Spanish poet whose name is known, born in Avila, Castile, in 1196, died about 1266. At the age of 12 he entered the monastery of San Millan, in the territory of Calahorra, which was exposed to constant incursions of the Moors; and he wrote his poems between 1220 and 1246. A contemporary of the most famous troubadours, unlike them he celebrated not the deeds of heroes and the beauty of ladies, but only religious subjects. His poems amount to more than 18,000 lines, chiefly on the lives of saints, the merits and miracles of the Virgin Mary, and the signs that are to precede the last judgment. They possess a regular and sometimes harmonious versification, and are marked by the simple, tender, and credulous piety which distinguished the Spanish people during their wars with the Moors. They form the 2d vol. in the *Coleccion de poesias Castellanas anteriores al siglo XV.*, by Sanchez (Madrid, 1775-'90).

GOOCHLAND, an E. co. of Va., bounded S. by James river; area, 260 sq. m.; pop. in 1850, 10,352, of whom 5,845 were slaves. Its surface is undulating, and its soil, watered by numerous creeks, was once highly fertile, but in certain places is now partly exhausted. Bituminous coal is found here in abundance, and a little gold has also been discovered. The James river canal passes through Goochland Court House, the capital. The productions in 1850 were 276,838 bushels of Indian corn, 141,-999 of wheat, 104,018 of oats, and 624,208 lbs. of tobacco. There were 20 corn and flour mills, 10 saw mills, 4 coal mines, 1 nail factory, 8 tanneries, 15 churches, and 320 pupils attending public schools. Formed in 1727, and named in honor of one of the governors of the colony. Value of real estate in 1850, \$2,218,768; in 1856, \$2,685,816, showing an increase of 19 per cent.

GOOD, JOHN MASON, an English physician and author, born in Epping, Essex, May 25, 1764, died in Jan. 1827. He began his medical education as apprentice to a surgeon at Gos-

port, afterward studied at Guy's hospital, and in 1784 commenced practice as a surgeon at Sudbury. Meeting with little success here, he removed to London in 1793, gained in time a large professional connection, and in 1820 received the degree of M.D. from Marischal college, Aberdeen. At the same time he was actively engaged in literary pursuits. In 1810 he delivered a course of lectures at the Surrey institute on the phenomena of the material world, the animate world, and the mind, which were afterward published collectively under the title of the "Book of Nature," the work by which he is best known. In 1812 he edited for George Woodfall the "Letters of Junius," comprising not only the acknowledged productions of that writer, but also over 100 letters and papers of doubtful authenticity, the authorship of which Dr. Good ascribed to Junius on internal evidence. To this work he prefixed a preliminary essay. He also contributed largely to the "World," a prominent daily newspaper of the time, the "Analytical and Critical Review," of which he was for a period the editor, and the "British" and "Monthly" magazines. He was an accomplished linguist, and some of his best reviews were on oriental literature. His principal works are: "Maria, an Elegiac Ode" (4to., London, 1786); "Diseases of Prisons and Poorhouses" (12mo., 1795); "History of Medicine as far as it relates to the Profession of an Apothecary" (12mo., 1795); "Parish Workhouses" (8vo., 1798, 1805); "Song of Songs, or Sacred Idyll, translated from the Hebrew, with Notes" (8vo., 1808); "Triumph of Britain, an Ode" (1808); "Memoirs of Alexander Geddes, LL.D." (8vo., 1803); "The Nature of Things," a translation from Lucretius, with notes (2 vols. 4to., 1805-'7); "Essay on Medical Technology" (8vo., 1810); "The Book of Job, literally translated from the Hebrew," with notes and a dissertation (8vo., 1812); "Physiological System of Nosology" (8vo., 1817); "Pantologia, or Encyclopædia comprising a General Dictionary of Arts, Sciences, and General Literature," in conjunction with Olinthus Gregory and Newton Bosworth, published periodically, and completed in 12 vols. in 1818; "Study of Medicine" (4 vols. 8vo., 1823); "Book of Nature" (3 vols. 8vo., 1826). His life was written by Dr. Gregory (London, 1828.)

GOOD FRIDAY, the anniversary of the crucifixion of the Saviour, so called in allusion to the benefits conferred on the world by his death. The Saxons named it "long Friday," because of the protracted religious services on that day; and the Germans term it *Siller Freitag*, on account of the solemn silence observed in the churches, or *Char-Freitag*, from an antiquated word signifying penitence. During the first 2 or 3 centuries of Christianity it was called the "pasch," because then Christ, the paschal lamb, was slain. Its celebration has been attended with peculiar rites. In most churches a sepulchre used to be constructed, and a crucifix was carried thither in procession and

deposited as in a tomb. The ciborium containing consecrated wafers was placed with it. At Tours, as St. Gregory of that place writes, the watchings were kept in darkness until the 8d hour of the night, when a small light appeared before the altar. Good Friday is the only day in the year on which mass is not celebrated in the Roman Catholic churches. A host is consecrated the day before for use on this day, and, having been placed over night in a repository generally erected for the purpose in a chapel or part of the church, is carried to the main altar and consumed by the priest. No consecrated wine is used, nor are the customary lights, incense, and music employed. The ceremony of kissing the cross, sometimes called "adoration of the cross," is performed by the clergy and people on their knees. In England this was anciently called "creeping to the cross," as appears by the following extract from a proclamation in the reign of Henry VIII: "On Good Friday it shall be declared howe creeping of the crosse signifyeth an humblynge of ourselfe to Christe before the crosse, and the kysynge of it a memorie of our redemption made upon the crosse." In some countries an image of Judas Iscariot was dressed up on this day and subjected to every sort of indignity. In the north of England it is customary to eat on Good Friday herb puddings in which a principal ingredient is the "passion dock," which, in fructification, produces fancied representations of the cross, nails, hammer, &c. A better known practice is that of serving "hot cross buns," which a popular superstition holds to be preservatives against fire and other disasters. In several English counties a small loaf of bread is baked on the morning of this day, and put by until the next year, to be used in morsels as a medicine.

**GOOD HOPE, CAPE OF.** See **CAPE OF GOOD HOPE.**

**GOOD WILL,** the interest or advantage supposed to be attached to a certain established business. Nothing can be more uncertain or intangible than this; and it was for some time a question whether the law would recognize it as of pecuniary value. But it is clear that it may have, under some circumstances, a very great pecuniary value. If a partnership be established in a certain place, and has there done business for a long time, in a way which has given general satisfaction and attracted a wide and to all appearance a permanent patronage or custom, whether this be by the excellence and variety of its stock of goods, its honesty and exactness, or its supposed wealth, this partnership has a pecuniary interest in this good will, in addition to the amount of its mere stock and capital. But, while as between partners this good will is generally considered to have a value, and will be recognized and provided for by courts of equity in settling any disputes between them, and in general passes by survivorship to the remaining partners when one or more die, yet the rules of law which enter into the adjustment of good will can hardly

be considered as settled. In case of insolvency, it is however clear that a court having jurisdiction of the case will recognize it as valuable, and will take care that no partner behave in such a way as to diminish its value, and will make due orders for reducing it by sale or otherwise into the form of available assets. But when the good will of a business passes by the insolvency of the trader into the hands of assignees, the trader is no longer under any obligations to continue his exertions to increase or sustain its value, although he must do nothing to injure it.—The good will of a business is often bought and sold, and made the subject of arrangement in various ways; and it would undoubtedly be regarded as a sufficient consideration for a promise to pay money. It has been held that the sale of a business, with the stock and "good will," carried with it, by implication, a promise not to enter upon a similar business so near to the old stand as to interfere materially with the purchaser. This would seem to be equitable, and ought to be provided for in any sale or transfer of the good will. We doubt, however, whether our courts would now infer such an agreement from a mere transfer of the good will, in the absence of any express stipulation on the subject.

**GOODALL, EDWARD,** an English engraver, born in Leeds in Sept. 1795. He is well known by his engravings from Turner's pictures, in which the artist's characteristics are reproduced with great fidelity. Of his smaller works, the illustrations in Rogers's "Italy" are the most widely known. His large line engravings of Turner's "Tivoli," "Cologne," and "Caligula's Bridge," are splendid specimens of the art.—**FREDERIC,** son of the preceding, and a painter, born in London, Sept. 17, 1822. At 14 years of age he received a prize from the society of arts for a drawing of Lambeth palace, and at 16 another for his first oil painting. He subsequently became a frequent exhibitor at the royal academy, of which he was elected an associate in 1852. He is an industrious and popular painter, and several of his works, such as "L'Allegro" and "The Soldier's Dream," have been engraved. His "Tired Soldier" and "Village Festival" are in the Vernon gallery.

**GOODHUE,** a S. E. co. of Minn., bordering on the Mississippi river, separated from Wis. by Lake Pepin, and watered by Cannon river; area, about 650 sq. m.; pop. in 1857, 6,951. It has a moderately uneven surface, and a soil suitable for grass, potatoes, and grain. It was taken from Wabashaw co. in 1852-'8. Capital, Redwing.

**GOODRICH, ELIZUR, D.D.,** an American clergyman and scholar, born in Wethersfield, Conn., Oct. 26, 1784, died in Norfolk, Conn., Nov. 21, 1797. He was graduated at Yale college in 1752, and was tutor there in 1755. So deeply interested was he in mathematics and astronomy, that in the busiest scenes of his subsequent ministry he rarely failed to calculate the eclipses of each successive year; and when the aurora borealis of 1780 made its appearance he drew

up one of the fullest and most accurate accounts of it ever published, with exact drawings of the auroral arch. In Nov. 1756, he was ordained minister of the Congregational church in Durham, in which office he continued till his death. He gave 14 hours daily to severe intellectual labor; was an accomplished teacher, having prepared some 300 young men for college and public life; and was also an active friend of the revolution, preaching on the right of resistance, and urging his people to lay down their property and lives in the conflict. He published several sermons, and left behind him some hundreds of elaborate essays on difficult passages of Scripture.—CHAUNCEY, son of the preceding, an American statesman, born in Durham, Conn., Oct. 20, 1759, died in Hartford, Aug. 18, 1815. He was graduated at Yale college in 1779; was tutor there for the next 2 years, and then entered on the practice of law in Hartford, where he soon rose to eminence. In 1793 he was chosen a member of the state legislature; in 1794 was elected to congress, of which body he was a member for 6 years; was a councillor of his native state from 1802 to 1807, when he was appointed U. S. senator, which office he held till 1818, when he resigned it to become lieutenant-governor of Connecticut. He was also for a time mayor of Hartford.—ELIZUR, brother of the preceding, born in Durham, Conn., March 24, 1761, died in New Haven, Nov. 1, 1849. Having been graduated at Yale college in 1779, where he was afterward tutor for 2 years, he entered on the practice of law in New Haven in 1783; in 1799 was chosen a member of congress, and in 1801 was appointed collector of the port of New Haven. He was also for many years in the legislature of his native state; was judge of the county court for 18 and judge of probate for 17 years, and mayor of New Haven from 1808 to 1822. For 9 years he was professor of law in Yale college, resigning this office in 1810.—CHAUNCEY ALLEN, son of the preceding, an American scholar and divine, born in New Haven, Conn., Oct. 23, 1790. He was graduated at Yale college in 1810, and was tutor in that institution from 1812 to 1814. After a course of theological study he entered the ministry of the gospel, and was pastor of a Congregational church in Middletown, Conn., in 1816 and 1817. In the latter year he was elected professor of rhetoric and oratory in Yale college. He continued in this office until 1839, when he was transferred to the professorship of pastoral theology in the theological department of the college, in which station he still remains. In the year 1820 he was chosen president of Williams college in Massachusetts, but he declined the appointment. He received the degree of D.D. from Brown university in 1835. In addition to the numerous and pressing duties of his place, he has performed a large amount of other labor. While in the tutorship he published in 1814 a Greek grammar, translated chiefly from the grammar of Hachenberg. This he subse-

quently revised and enlarged, and published under his own name. It was often reprinted, and for many years was extensively used. About the year 1832 he published "Latin Lessons" and "Greek Lessons," in which the precepts of grammar are throughout accompanied by practical exercises—a method subsequently applied by Ollendorff to modern languages. During several years he edited the "Quarterly Christian Spectator," and was a contributor to the previous series of the same work. In 1828 Dr. Noah Webster (his father-in-law) intrusted to him the superintendence of the octavo abridgment of his large dictionary, by Mr. J. E. Worcester, with discretionary power to conform the orthography more nearly to the common standard. After several years of labor, he published in 1847 greatly enlarged and improved editions of the 4to. and 8vo. dictionaries of Dr. Webster. These works are models of condensation and fulness, and have gained a very wide circulation. In 1853 he published a large 8vo. volume entitled "Select British Eloquence, embracing the best Speeches entire of the most eminent Orators of Great Britain for the last two centuries, with Sketches of their Lives, an Estimate of their Genius, and Notes critical and explanatory." In 1856 he published in 8vo. the new university edition of Webster's dictionary, and in 1859 a new issue of the unabridged 4to. dictionary, with a large appendix of additional words, a collection of synonyms with discriminating explanations, a pronouncing list of names of celebrated persons, and a series of pictorial illustrations.—SAMUEL GRISWOLD, better known under the assumed name of PETER PARLEY, nephew of the preceding, an American author, born in Ridgefield, Conn., Aug. 19, 1798. He engaged in the publishing business in Hartford, and, after visiting Europe in 1824, established himself as a publisher in Boston, and edited from 1838 to 1843 the "Token," an original illustrated annual, to which he contributed several tales and poems. In it appeared some of the finest of Hawthorne's "Twice-told Tales." His famous Peter Parley series of juvenile books was begun soon after his removal to Boston, and gradually extended to more than 40 volumes, comprising geographies, histories, travels, stories, and various illustrations of the arts and sciences. Three million copies of Peter Parley's "Geography for Beginners" were sold. The success of these works caused several spurious books to appear under his pseudonym. In 1837 he published a collection of his poems, entitled the "Outcast and other Poems;" in 1838 a volume of counsels to parents, entitled "Fireside Education;" in 1841 a selection from his various contributions to annuals and magazines, with the title of "Sketches from a Student's Window;" in 1851 an illustrated edition of his poems; and in 1857 his "Recollections of a Lifetime." He established "Merry's Museum and Parley's Magazine," and edited it from 1841 to 1854. He was U. S. consul at Paris under President Fillmore, and published there in French a treatise

on American geography and history. Many of his works have been translated into French by M. du Buisson. His last work is entitled "Illustrated Natural History of the Animal Kingdom" (2 vols. 8vo., 1859).—FRANK BOOT, son of the preceding, an American author, born in Boston in 1836. He was for several years the Paris correspondent of the "New York Times" newspaper, under the name of Dick Tinto, and his letters were collected in a volume entitled "Tricolored Sketches of Paris" (New York, 1854). He has since published the "Court of Napoleon, or Society under the First Empire, with Portraits of its Beauties, Wits, and Heroines" (New York, 1857); "Man upon the Sea, or a History of Maritime Adventure, Exploration, and Discovery" (Philadelphia, 1858); and an elegant illustrated volume entitled "Women of Beauty and Heroism" (New York, 1859).

**GOODWIN SANDS**, two dangerous sand banks off the E. coast of Kent, England, separated from the mainland by the channel called the Downs, about 10 m. in length and from 1½ to 3 m. in breadth. They are loose and shifting, and many parts of them are dry at low water. At their N. and S. extremities and near the channel which divides them, there are 8 lightships stationed, and in hazy weather a bell is kept constantly ringing to warn vessels of their danger. These sands are said to have once formed part of Kent, and to have belonged to the famous Saxon earl Godwin, whence their name. They were submerged toward the close of the 11th century.

**GOODYEAR, CHARLES**, an American inventor, born in New Haven, Conn., Dec. 29, 1800. He attended a public school, and during his boyhood, when not at study, assisted his father, Amasa Goodyear, who was a pioneer in the manufacture of American hardware. After coming of age, he joined his father in the hardware business at Philadelphia. Among the improved implements introduced by them was the steel pitchfork, a substitute for the heavy iron fork previously used. The firm being overwhelmed by the commercial disasters of 1830, Goodyear selected as a new occupation the improvement of the manufacture of India rubber. Moving from place to place in order to avail himself of special opportunities, his early experiments and labors were carried on at New Haven, Conn., Roxbury, Lynn, Boston, and Woburn, Mass., and the city of New York. The first important improvement made by him was at New York in 1836, being a method of treating the surface of native India rubber by dipping it into a preparation of nitric acid. This discovery enabled the manufacturer to expose an India rubber surface in his goods, which on account of adhesiveness was before impracticable. The nitric acid gas process, as it was called, was introduced into public use, and met with great favor, especially in the manufacture of shoes, which continued to be made by that process in great numbers at Providence, R. I., until it was superseded by the superior method of vulcaniza-

tion. The beneficial effect of the nitric acid process was confined to the surface, the interior body of the gum remaining subject to all the defects of native India rubber. It did not satisfy the hopes of Goodyear, and he persevered in the effort to discover something more complete. Sulphur had been noticed as producing remarkable drying effects upon India rubber, and in 1838-'9 Goodyear made at Woburn, Mass., many experiments with compounds of India rubber and sulphur. In the course of these experiments, about Jan. 1839, he observed that a piece of India rubber, mixed with ingredients among which was sulphur, upon being accidentally brought in contact with a red-hot stove, was not melted, but that in certain portions it was charred, and in other portions it remained elastic though deprived of adhesiveness. The material was vulcanized; i. e., it had undergone the change produced by a high degree of artificial heat. Thus were presented the germs of the two forms of vulcanized India rubber, now commonly known as the soft and the hard compounds. From 1839 to the present day the process of vulcanization has occupied Mr. Goodyear's whole attention. He has reaped no adequate pecuniary reward for his labors. The Goodyear patents, now more than 60 in number, have been very expensive in themselves, and still more so from the necessity of defending and protecting them against infringers. The first publication to the world of the process of vulcanization was Goodyear's patent for France, dated April 16, 1844. The French laws require that the patentee shall put and keep his invention in public use in France within two years from its date. Goodyear had, at great inconvenience and expense, endeavored to comply with this and with all other requirements of the French laws, and thought he had effectually done so; but the courts of France decided that he had not in every particular complied with the strict requisitions of the law, and that therefore his patent in France had become void. In England he was still more unfortunate. Having sent specimens of vulcanized fabrics to Charles Mackintosh and co. in 1842, and having opened with them a negotiation for the sale of the secret of the invention or discovery, one of the partners of that firm named Thomas Hancock, availing himself, as he admits, of the hints and opportunities thus presented to him, re-discovered, as he affirms, the process of vulcanization, and described it in a patent for England, which was enrolled on May 21, 1844, about 5 weeks after the specification and publication of the discovery to the world by Goodyear's patent for vulcanization in France. And the patent of Hancock, held good according to a peculiarity of English law, thus superseded Goodyear's English patent for vulcanization, which bore date a few days later. Goodyear, however, obtained the great council medal of the exhibition of all nations at London, the grand medal of the world's exhibition at Paris, and the ribbon of the legion of honor,



presented by Napoleon III. He has in an advanced stage of preparation a volume upon India rubber and vulcanization.

GOOKIN, DANIEL, an American author, and major-general of Massachusetts, born in Kent, England, about 1612, died in Cambridge, Mass., March 19, 1687. He came with his father to Virginia in 1621, whence he removed in 1644 to Massachusetts, in consequence of his sympathy with the doctrines of the Puritans. He settled in Cambridge, was soon after appointed a captain of militia, and in 1656 became superintendent of all the Indians who had submitted to the government of Massachusetts, an office which he held till his death. He protected the fugitive regicides in 1661, was appointed one of the two licensers of the Cambridge printing press in the following year, became unpopular during King Philip's war by the protection which, as a magistrate, he extended to the Indians, and in 1681 was made major-general of the colony. He died so poor that John Eliot solicited from Robert Boyle a gift of £10 for his widow. His work, entitled "Historical Collections of the Indians of Massachusetts," bears the date of 1674, and was first published by the Massachusetts historical society in 1792. He is said to have written also a history of New England, of which no manuscript has been found.

GOOMTY, or GOOMTEE (Hin. *Gomati*), a river of British India, rising in the district of Shahjehanpore, in a small lake 19 m. E. of Pillibheet, lat. 28° 35' N., long. 80° 10' E., and after a S. E. course of 482 m., in which it traverses the territory of Oude, falling into the Ganges, on its left side, in lat. 25° 29', long. 83° 15'. The principal town on its banks is Lucknow, 808 m. from its mouth, to which it is navigable. It is a wide stream, and capable of becoming an important channel of commerce. Its general depth in the dry season is seldom less than 4 feet, and it rises 15 feet at Lucknow during the rainy season; its only obstructions are ridges of calcareous conglomerate, which could easily be removed. It has an unusual abundance of fish. Its waters are often so impure as to breed diseases along its course.

GOORGAON, a district of British India, in the administrative division of Delhi, lieut. governorship of the Punjab and dependencies, between lat. 27° 40' and 28° 30' N., long. 76° 21' and 77° 35' E.; area, 1,942 sq. m.; pop. 662,486, of whom 460,774 are Hindoos. It is diversified by lofty mountains and low alluvial plains. The climate is warm and arid, and in certain localities very unhealthy in the autumn.

GOOSANDER, an American fishing duck, of the sub-family *merginae*, and genus *mergus* (Linn.); beside the goosander (*M. americanus*, Cassin), the sub-family includes the mergansers and the smew. The bird is about 27 inches long, and 8 feet in extent of wings; the bill about 8 inches, of a bright red color; weight 5 lbs.; the female is considerably smaller. Common names of this species are saw-bill, sheldrake, and, for the female, dun diver. The

feathers of the forehead extend in an acute angle on the bill; the nostrils are large, and near the middle of the bill; the plumage is full, soft, and glossy; there is a slight crest in the male; the wings and tail are short, the latter rounded, with 16 feathers; the iris is carmine; the feet orange red in winter, vermilion in the breeding season; the bill narrow, compressed, with a conspicuous black nail, the edges with sharp recurved serrations; tarsi  $\frac{1}{2}$  the length of the middle toe, much compressed. The head and neck are metallic green; lower neck and rest of body beneath creamy white, becoming salmon red; fore part of back black; lower back, rump, and tail feathers ashy gray; most of the wings creamy white, except the greater coverts, which are black at the base, forming a black bar, and the tertials narrowly edged with black; primaries black; sides with slight transverse bars. In the female the head and neck are chestnut; above ashy, salmon colored below; the black base of the secondaries is entirely concealed, and there is less white on the wings. In the European sheldrake (*M. merganser*, Linn.) the bill is relatively longer and narrower; the elongated feathers forming the crest are longer and more erectile, and begin almost at the base of the bill; and the bar of black on the wings is concealed by the lesser coverts. The American bird was considered the same as the European, until separated by Mr. Cassin in 1858. The goosander is found throughout North America, breeding in the temperate and northern regions, in the neighborhood of both salt and fresh water; it is abundant in the fur countries. It is strong and active, a powerful swimmer, excellent diver, and rapid flier; it swims very deeply, presenting a small mark for the gunner, diving at the flash or at the click of the lock; it can run very well on land. It is very voracious, feeding on fish, mollusks, aquatic reptiles, crawfish, leeches, &c.; it dives for its prey, rising to the surface with the fish or other animal in its serrated bill, swallows it head foremost, and then plunges for more; its flesh is tough and oily, and hardly fit for food. The nest is made near the water, of weeds and roots, and is lined with its down; it is about 7½ inches in diameter internally, and 4 inches deep; the eggs, 7 or 8, are 8 inches long by 2 broad, smooth, elliptical, and of a uniform dull cream color; the young of a few hours old are excellent divers. The note is a harsh croak. They are easily caught, like the loon, on hooks baited with fish. In their digestive organs, the mergansers are more allied to the divers (*colymbidae*) than to the ducks (*anatidae*), and seem to form one of the connecting links between the two families.

GOOSE, a web-footed bird, of the order *anseræ*, and family *anatidae*, of which the typical species are in the sub-family *anserina*. The other sub-family consists of the *plectropteri-na*, or spur-winged geese, in which the bend of the wings is armed with a spur or blunt tubercle; it contains the genera *anseranas* (Less.), of Ans-

tralia; *plectropterus* (Leach), of Africa, having a naked protuberance at the base of the culmen and a part of the neck bare; *sarkidiornis* (Eytton), of the warm regions of America, India, and Africa, having a large, rounded, laterally compressed caruncle on the top of the bill; and *chenalopez* (Steph.), of Africa and tropical America; of the last the Egyptian or fox goose (*C. Egyptianus*, Linn.) is a species, bright-colored, and revered by the ancient Egyptians on account of its attachment to its young; it has been domesticated in that country.—The subfamily *anserina*, which includes the genera *cerropus* (Lath.), *anser* (Linn.), *bernicle* (Stephens), *nettapus* (Brandt), and a few others separated from these by modern systematists, are characterized by a moderately long neck, bill elevated at the base, as long as or shorter than the head, narrowing to the tip, which is chiefly formed by a large nail, and region in front of the eyes feathered; the long tibia and tarsus elevate the body more than in others of the family, making them good walkers on the land, while they are also excellent swimmers; the plates on the front of the tarsus are small and hexagonal, as in the swans, and are not transverse scutellæ as in the true ducks; the colors are rarely brilliant, white, black, and gray predominating, and both sexes, as in the swans, are colored alike. In the genus *cerropus* (Lath.) the bill is very short, with a large and broad nail; it belongs to Australia, where it wanders on the land in search of grasses, on which it principally feeds, being never seen on the water; the only species (*C. Nova Hollandia*, Lath.) is of a gray color, of the size of the common goose, and is said to be easily domesticated.—The genus *anser* (Linn.) is characterized by a bill as long as the head, mostly red or orange colored; the lamellæ of the upper mandible project below the edge of the bill as conical points; the nostrils open behind the middle of the commissure; the tip of the hind toe reaches the ground. The wild goose or gray-lag of Europe (*A. ferus*, Gesn.), the original of the common domesticated race, is of a gray color, with a brown mantle undulated with gray, and an orange bill. The bean goose (*A. segetum*, Gmel.) is by some considered a distinct species, and by others a mere variety of the wild goose; the wings seem to be longer, and the forehead is marked with white spots; whether a species or a variety, the bean goose is probably more or less mixed with the former in some of the domesticated races. Wild geese seek high latitudes in the breeding season and in summer, returning to the warmer parts of Europe in the winter; they are found mostly in meadows and marshes in the interior, where they feed in the daytime on aquatic plants, grasses, and grains; they walk well, and are very light on the water, on which they generally rest during the night; they do not dive, but plunge the head under water to the extent of their long neck; they are rapid and powerful fliers, migrating in two lines meeting at an acute angle; they

are not polygamous, make their nests on the ground, and are very fond of their mates; the young are able to walk as soon as born, and feed of their own accord. The flight of wild geese is performed without noise, and with an order which indicates considerable intelligence; each individual keeps its place in the ranks, the male bird at the head of the triangle or line, when it becomes fatigued, retiring to the rear, and the next one coming forward to take the leading and most fatiguing position; they follow the leader blindly, sometimes to their own destruction. Their sight and hearing are acute, and while they feed or sleep a sentinel is always on the watch to give the alarm at the approach of danger. The awkward gait, outstretched neck, gaping mouth, and disagreeable voice have obtained for the goose the character of stupidity, while in reality it is remarkably intelligent. From the height at which they fly, their resting on the water, and their vigilance, they are very difficult to obtain, a fact which has found expression in the saying, "a wild goose chase," as indicating the hopeless pursuit of any object. The flesh is not very wholesome nor digestible. The Chinese, *tsin-tsu*, or Guinea goose (*A. cygnoides*, Gmel.), called from its size the swan goose, is more than 8 feet long; the bill is orange, with a large knob or excrescence on the forehead; under the throat is a pouch, almost bare of feathers; the color above is pale grayish brown, with paler edges; a black line on the back of the neck; anterior neck and breast yellowish brown; belly white; sides over thighs gray-brown and white; in some varieties the bill, knob, and legs are black; the throat may be wattled, and the plumage mostly or entirely white. Originally from China, they have spread extensively over Asia, Africa, and Europe, and have been imported into the United States; they mix freely with the common goose, producing fertile hybrids; they are very noisy and easily alarmed; they walk erect, with the neck much elevated, more like a swan than a goose. Among the American species of the genus is the white-fronted or laughing goose (*A. gambelii*, Hartl.), which has been separated from the European bird (*A. albifrons*, Gmel.), on account of the greater length of the bill. The length is 28 inches, and the extent of wings 5 feet; weight about 5½ lbs. The bill and legs are red; forehead white, margined behind with blackish brown; rest of head and neck grayish brown, paler on the throat; back and sides bluish gray, feathers anteriorly tipped with brown; breast and belly grayish white, with brownish black tints, white in the anal region; tail brown, white tipped; secondaries and end of primaries dark brown, rest of wing silvery ash, the greater coverts edged with white. This species is found over the whole of North America, but is rare along the Atlantic coast; they retire to the north in March and April, returning in October; they are not so shy as other species, and their flesh is considered a delicacy; their food consists principally of land plants.

The notes are loud, resembling a laugh; hence one of their common names. The egg is  $2\frac{1}{2}$  by  $1\frac{1}{2}$  inches, of a dull yellowish green color, with indistinct darker patches. The snow goose (*A. hyperboreus*, Pallas) is larger, measuring 80 inches in length and 62 in extent of wings, with a weight of nearly 7 lbs. In the adult, the bill and legs are red; the general color pure white, with the primaries black toward the end and bluish gray at the base; the young, or blue-winged geese, have a more bluish and ashy tint, with patches of dark brown, constituting the *A. corulescens* (Linn.), which some regard as a distinct species. It is found all over North America, breeding in the far north; when young, its flesh is tender, and far superior to that of the Canada goose; those that feed on the seashore have a fishy taste. The egg is yellowish white, 3 by 2 inches. The usual food consists of grasses, rushes, insects, and, in the autumn, berries; it mates with the common goose, though the eggs are rarely if ever hatched. Other species of the genus are the *A. frontalis* (Baird), from the interior of North America, resembling a diminutive white-fronted goose; and *A. minutus* (Naum.) and *A. Bruchii* (Brehm.) of Europe.—The American wild or Canada goose belongs to the genus *bernici* (Stephens), which is characterized by a bill shorter than the head, and by the black color of the legs; the lamellæ of the upper jaw concealed by the margin of the bill; nostrils over the middle of the commissure; the hind toe elevated and rudimentary, not touching the ground. The species of this genus migrate from the high latitudes of Europe, Asia, and America, where they spend the summer, to the more southern parts in winter, especially South America; they feed chiefly on marine grasses and algae, though some live far from water, eating seeds, berries, &c. The Canada goose (*B. Canadensis*, Linn.) is about 3 feet long, with an extent of wings of 65 inches, and a weight of 7 lbs. The head, neck, bill, feet, and tail are black; a large, triangular patch of white on the cheeks behind the eyes, confluent below; upper parts grayish brown, with paler edges; lower lid white; below grayish white, passing into pure white near the anal region; upper tail coverts white; primaries and rump dark brown. It is found throughout North America, and accidentally in Europe; the spring migration northward begins with the melting of the snow, from March 20 to April 30, and the return commences in the first half of September, the birds passing along the coast, but most numerous in the interior; their flight is very high, their "houk" often being heard when the birds cannot be seen, and very regular unless interrupted by fogs, storms, or unexpected accidents. The food consists of the seeds of grasses and aquatic plants, slugs and snails, worms, insects, tender blades of corn, and crustacea, shell fish, and marine plants on the seashore. They are not often found in company with other species; the senses of sight

and hearing are very acute, and their stratagems for avoiding their enemies evince great cunning; they rarely dive, unless when attempting to escape, at which times both old and young quickly disappear. The males are very pugnacious during their courtship, and defend their sitting mates against all enemies; the nest is built on the ground in some retired spot near the water, of dried plants; the eggs of the wild bird are usually about 6, though the domesticated birds lay a few more; they average  $3\frac{1}{2}$  by  $2\frac{1}{2}$  inches, are smooth, thick-shelled, and of a dull yellowish green color; the period of incubation is 28 days, and they have only one brood in a season: the young are able to follow their parents to the water in a day or two, but many are destroyed in spite of the watchfulness of the mother by snapping turtles, gar fish, pickerel, and birds and beasts of prey. They are shot from ambush at their feeding places, and may be attracted by living or artificial decoys; the flesh of such as have lived in the interior is very agreeable, but rather strong and fishy in the shore-fed birds. Beside man and the animals just mentioned, their worst enemies are alligators, the cougar, lynx, and raccoon, and the white-headed eagle. They are readily domesticated, and when tame are advantageously crossed with the common goose, the resulting brood being larger and more easily raised and fattened than the originals. The flesh and eggs are valuable as food, the feathers for beds, the quills for writing purposes, and their oil in domestic medicine. Hutchins's goose (*B. Hutchinsii*, Rich.), called by the gunners winter or flight goose, is 25 inches long, with an extent of wings of 50 inches, and a weight of about 4½ lbs.; in its colors it is precisely like the Canada goose; the eggs are pure white, 3 by 2 inches; it is found throughout the northern and western parts of America; its flesh is of excellent flavor. The *B. leucopareia* (Brandt), from the west coast of America, is about 30 inches long, with an extent of wings of about 5 feet; it resembles the Canada goose, but is smaller, and of a darker color, especially on the under parts. The brant goose (*B. brenta*, Steph.) is about 2 feet long, with an extent of wings of 4 feet, and a weight of 8½ lbs. This species may be known by the white crescent on the middle of the side of its black neck; the general color of the upper parts is brownish gray with lighter margins to the feathers; the wings and tail are darker, and the upper tail coverts white; lower parts grayish, passing into white behind. It is a salt water bird, breeding in the north, and coming along the Atlantic coast on its return south in the middle of autumn; its flesh is considered by epicures a most savory food. It is shy, a good walker, an excellent swimmer, and, when wounded, a most expert diver; its food consists of marine plants, mollusks, and crustaceans; it is easily tamed, and in captivity thrives well on grain, and produces young; the eggs are white. It is found on the Atlantic coasts of North America and Europe. It is replaced on the Pacific

coast by the black brant (*B. nigricans*, Lawr.); the anterior part of the body of the latter is black, the rest dark plumbeous, with white patches on the throat, sides of rump, and tail coverts; the bill is wider than in the common brant. The barnacle goose (*B. leucopsis*, Bechst.) is 28 inches long, with an extent of wings of 4½ feet, and a weight of a little over 4 lbs.; the forehead, cheeks, and lower parts are white, the belly with a bluish tint; the crown, neck, anterior back, rump, and tail black; mantle ash-colored. It is common in winter in northern Europe, especially on the western shores of Great Britain, but is doubtful as an inhabitant of the United States; it is a salt water species, very shy, and highly esteemed as food; the eggs are yellowish cream-colored, about 8 by 2 inches. It has been the subject of two remarkable fables (alluded to in the article BARNACLE), which have given it its most common names; it has been called "tree goose" from the belief that it originated from old and decayed trees, and "barnacle goose" from the supposition that it was produced by the barnacle, a cirriped articulate animal, often found adhering to old wood.—There are several large species of geese in South America, of which the most remarkable are the antarctic (*B. antarctica*, Gmel.), the males snowy white, and the females black with transverse white lines; and the Magellanic (*B. Magellanica*, Gmel.), ferruginous brown and black, with white wing coverts, and bar on tail. The painted goose (*B. Canagica*, Bon., or *picta*, Pall.), of large size, of a bluish gray color, with head, nape, and tail white, black throat with white dots, and quills with a black stripe anterior to the white tip, is common in the Aleutian islands, and is doubtless also found on the N. W. coast of the United States.—The last genus of *anserina* is *nettion* (Brandt), found in the lakes, rivers, and estuaries of continental India, Africa, and Australia. The bill is small and elevated, with short and widely set lamellæ; the nostrils basal; wings moderate and pointed; tail short and rounded; the species are of small size. Mr. Blyth says that "the Indian species seems totally incapable of standing or walking on the ground, but invariably flutters along it in a strange, scuffling manner, like a wounded bird; they always descend into the water, never alighting on the ground of their own accord." The Ooromandel goose (*N. Ooromandelianus*, Gmel.), of the size of a teal, has the head and neck white with black spots; crown black; lower neck with black lines; above brown with a greenish and reddish gloss; beneath white.—Mr. Baird places the genus *dendrocygna* (Swains.) in the goose family, but most authors rank it with the *anatina* or ducks; it is allied to the geese more than to the ducks by the elevated base and large nail of the bill, the long legs, and the hexagonal scales in front of the tarsus; he describes 8 species as inhabiting the United States.—The common tame goose is the European wild bird domesticated, from which it varies considerably in color, though

less than ducks and fowls do from their wild originals; it tends to a general gray color, though the vent and upper tail coverts are always white; the males are sometimes entirely white, and the females generally cinereous and gray. In England, Lincolnshire is famous for the raising of geese; on the continent, Hamburg, Bremen, and Emden, and their neighborhoods, raise the best breeds. Before the time of railroads many thousands together were driven from distant counties to London, travelling 8 or 10 miles a day; the price used to be regulated by that of mutton, being the same per pound, and it does not vary much from this now. The usual weight of a fine goose is 15 or 16 lbs., and by cramming with nourishing food this weight may be doubled; by confining the bird, to prevent motion, and employing fattening diet and stupefying substances, the body becomes loaded with fat, and the liver becomes enlarged and fatty from disease, forming the principal ingredient in the *pâté de foie gras* so much esteemed by epicures. Geese are in the best condition for the table about Christmas time; in England the feast of St. Michael, and on the continent that of St. Martin, are almost universally celebrated by roast goose. Before the days of metallic pens, goose quills formed a considerable article of trade, the living bird being stripped once and sometimes twice a year for this purpose; the value of the feathers for beds and pillows is well known, the living birds being plucked from 8 to 5 times in a year, at which periods, if cold weather come on, many die; if well fed and cared for, a goose will yield about a pound of feathers in a season. They generally breed only once a year, laying every other day, and depositing 7 or 8 eggs; incubation is about 30 days, and the female will sometimes produce enough for 3 broods, if the eggs are taken away in succession; they begin to lay early, are close sitters, and careful of their young; they grow fast, are little liable to disease, and are fattened by grain in a short time; when in a locality where they can pick up much of their food, they are profitable to raise for their flesh and that of the goslings, for their quills, and especially for their feathers. In the United States the common tame goose of Europe, in which the ganders are white and the females gray, is the most numerous, and perhaps as profitable as any. The white Bremen goose is of larger size, handsome, and easily raised, but less prolific and hardy. The China or tohin-tchu goose, with its variety the Guinea or African goose, is very large and swan-like, at maturity weighing 50 lbs. per pair. A cross between the last and the Bremen bird, called sometimes the mountain goose, is highly prized for the table, and attains a weight of 85 or 40 lbs. per pair; it comes to maturity early, and can be reared in 16 weeks to a weight of 14 lbs., dressed. The Canada goose is sometimes tamed, especially in northern and thinly settled localities; it mixes with the common goose, though of a different genus, and the mongrels,

which are not prolific, are considered a great delicacy. The goose is a very long-lived bird, its age having been known to equal 100 years. It is probable that many wild species, in different parts of the world, might by a little care be brought into a state of domestication, and thus increase the number of these useful servants of man.

GOOSE FISH, an acanthopterous fish of the lophioid family, which contains some of the most hideous and voracious of the class. It belongs to the genus *lophius* (Artedi), characterized by a head enormously large, broad, and flat; the body slender, smooth, with 2 separate dorsal fins; the mouth very wide, the lower jaw the longer, armed with numerous movable, sharp, conical, recurved teeth on the jaws, palates, vomer, and pharyngeal bones; tongue smooth; branchial rays 6, and branchial arches 8. Numerous fleshy appendages or *cirri* are arranged along the edge of the lower jaw, the pectoral fins, and to the base of the tail; there are several spines upon the head, 2 just behind the snout, others over the eyes and at the back part of the skull; the anterior rays of the dorsal, situated on the head, are separated as 2 slender tentacles, the first generally with a fleshy appendage, joined to the skull by bony rings, and capable of free motion at the will of the animal. The pectorals are elongated into a kind of arm, the rays representing fingers, by which some members of the family are enabled to move as upon legs; hence Ouvier's name of *pectorales pediculati*; these fins are large and digitate at the end, and behind and beneath them are the large branchial apertures; the ventrals are stout and fleshy, considerably in front of the pectorals; the tail is stout and digitate at the end. The eyes are large and oval; the nostrils are peculiar in being placed at the end of an erectile tube, the summit of which expands like the cup of a flower, and which is directed toward any odorous object. The skeleton is fibrous rather than bony; the stomach is very large and muscular, and the intestine short; the spinal cord is as long as in other fishes, but is remarkably reduced in size below its anterior third, while the nerves which arise from it form a large bundle within the spinal canal, completely concealing the cord. Wagner, Longuet, and Owen fell into an error in regard to the extent of the cord in this fish, while Ouvier's description is correct. There are 5 species described, of which the *L. Americanus* (Ouv.) and *L. piscatorius* (Linn.) are the best known. The American goose fish grows to a length of 4 or 5 feet, varying in weight from 15 to 70 lbs.; it is not a common fish, though seen on beaches of the northern and middle states after storms. Its appetite is most voracious, and it feeds upon all kinds of fish, even its own species; entire sea fowl, such as gulls and ducks, have been found in its stomach; it is occasionally taken by the hook and in nets, but is good for nothing, not even its liver containing much oil. Though considered a stupid fish,

and sometimes running ashore of its own accord, its arts for securing prey have been noticed from the time of Aristotle to the present day; being a poor swimmer from the feebleness of its pectoral fins, it remains hidden in the mud or sand, waving its fleshy appendages, which are mistaken in the turbid water for food by fishes, which are thus drawn within the reach of its capacious gape; this habit indicates no more intelligence than the other instincts of animals for securing food, but it certainly is, as Cicero has expressed it in his *Natura Deorum*, a remarkable instance of creative design. From this habit of fishing, it has been called angler and fishing frog, and from its hideous appearance and immense mouth, sea devil, wide gab, and devil-fish. The color of the *L. Americanus* is dark brown, sometimes in blotches, and dirty white below. The *L. piscatorius* is not uncommon in the seas of Europe, where it grows to the length of from 3 to 5 feet; its voracity is equal to that of its American congener, and the fishermen often find in its capacious stomach fish which make a welcome addition to their fare; the color is brown above, the fins darker, with the under surface white. When we consider the ugly proportions of this fish, its dull color and sluggishness, its staring eyes, huge gape, numerous teeth, and head studded with spines, long filaments, and cirri, we do not wonder at the names given to this hideous monster of the deep.

GOOSEBERRY (*ribes grossularia*, Linn.), the name of a familiar garden fruit of small size. The London horticultural society's catalogue (1842) enumerates 149 distinct kinds. The original species is indigenous to England, France, Germany, and Switzerland, and has been found in the Himalayas, and on the banks of the Ganges (Royle). A variety, with smooth fruit, is the *R. uva crispata* (Persoon), which occurs in similar situations. The cultivation of the gooseberry in gardens was first successfully undertaken by the Dutch; but up to the time of Miller it had gained but little reputation as a table fruit in England. From the prickles on the skin, resembling those of the furze or gorze, it has been conjectured, arose the name of gorzeberry, whence gooseberry; others suppose that the name originated from the use of the berry as a sauce for geese. The gooseberry is represented in the United States by several species, of which the most common is the wild gooseberry (*R. cynosbati*, Linn.), with large berries armed with long prickles like a bur, or rarely smooth-skinned. It is found from Canada to the Rocky Mountains near the sources of the Platt river. Its fruit is pleasant to the taste. The commonest smooth gooseberry of New England is the *R. hirtellum* (Mx.), with small, smooth, purple, sweet fruit. Another species, *R. rotundifolium* (Mx.), grows upon rocky places in western Massachusetts, and extends to Wisconsin, and southward along the mountains to Virginia. This bears a smooth-skinned, pleasant fruit. The swamp gooseberry (*R.*

*lacustris*, Poiret) is found in mountain swamps from Massachusetts and New York to the arctic circle, and, according to Douglas, in the mountains of Oregon and northern California. This species differs from others in its many-flowered racemes. Its fruit is dark purple, and is unpleasant to the taste. The cultivation of the garden varieties of the gooseberry is somewhat difficult in this country, in consequence of dry weather in the early summer succeeding the rains of the spring; and when the atmosphere is moist, though the soil is dry, the berries become overgrown with an insidious mildew (*erysiphe mors uva*, Schw.), which effectually prevents their perfect growth. Repeated application of a wash made with flowers of sulphur will alone destroy this mildew, and save the crop; but the trouble is generally considered too great for the result. A variety or hybrid, with good-sized berries of a greenish-purple color and pleasant flavor, called "Houghton's seedling," originating in the vicinity of Boston, is much planted in small gardens, proving free from the attacks of this fungus. In some parts of New England the garden varieties are much valued and largely cultivated, and the berries by judicious management attain an extraordinary size. The gooseberry thrives best in a rather cool and partially shaded aspect; and it has been observed that the direct rays of the sun striking upon the bushes and fruit, when grown near walls and fences, cause the berries to scald, so that they fall, so rapid is the evaporation which takes place from its succulent tissues.

GOPHER, the common name of two very different American animals, the one composing the rodent genera *geomys* and *thomomys*, the other the large land tortoise, *testudo polyphemus*, of the southern states; where the name is used for the latter animal, the rodents are almost universally called salamanders. On account of this confusion of names, it is necessary to ascertain the region of country of a speaker or writer before it can be known whether a mammal or a reptile be referred to. In Illinois and other western states the term gopher is also given to other rodents of the genus *spermophilus* (Cuv.), which will be noticed under their proper name of PRAIRIE SQUIRREL. The rodent gophers, or pouched rats, as they are often called, constitute the sub-family *geomyina*, characterized by large external cheek pouches, hairy undwelt upper lip, molars  $\frac{3}{4}$ , great development of temporal bones, massive skull and lower jaw, very large and thick incisors, small ante-orbital foramen far forward on the side of the muzzle, broad occiput forming the posterior wall of the skull, and remarkable contraction between the orbits, where the bones are narrower than the snout; the palate is horizontal between the molars, rising rapidly in front of them to near the incisors, leaving a deep concavity between them and the molars; the body is thick-set and clumsy, the limbs equal and very short, the claws on the fore feet enormously developed for digging purposes. They are subterranean and

nocturnal animals, rarely seen, and confined to North America; they are very abundant in certain districts west of the Mississippi; their colors vary much with age and season. The genus *geomys* (Rafinesque), or *pseudostoma* (Say), in addition to the above family characters, has the anterior surface of the upper incisors marked with one or two grooves, the crown of the rootless molars with an elliptical outline, very thick zygomatic arches, the lower outline of the under jaw a curve mostly parallel to the inferior surface of the incisors, the bones of the fore leg stouter than those of the posterior, and the clavicles well developed; the eyes are small and far apart, the ears hardly perceptible; no appearance of neck, the thickest part of the animal being about the head; the opening of the mouth very small, with a chamber between the incisors and molars lined with skin and mostly covered with short hair; the lower lip tumid and very movable. The cheek pouches cover the sides of the head, extending back to the middle of the scapula, and are capable of great distention; they are well clothed with hair on the side next to the head, and on the other nearly naked; they always open outside, and never communicate with the mouth; the body is covered with soft hair; the tail is thickened, hairy, tapering toward the tip, which is naked for about  $\frac{1}{2}$  an inch; the feet are 5-toed, covered with hair above, smooth and tumid below, with a large tubercle on the palm; the fingers and toes may be completely flexed; the claws are long, curved, compressed, and sharp below, smaller, thicker, and conical on the hind feet. The species are mostly found east of the Rocky mountains, and are very abundant in Missouri, Illinois, and Iowa; they are also found in Canada, Texas, Mexico, and the gulf states, but not on the Atlantic coast north of the Savannah river. The pouched gopher (*G. bursarius*, Shaw) is from 8 to 10 inches long, the tail  $2\frac{1}{2}$  to  $3\frac{1}{2}$ , and the weight from 12 to 14 oz. The prevailing color is reddish brown above, ashy brown beneath, with the feet white; in the warm season, and in young animals, the general color is plumbeous. They burrow in sandy soils, throwing up the earth in little mounds by means of the back and shoulders; they feed on grasses, roots, nuts, &c., which they carry to their holes in their pouches; they are injurious to vegetation by eating the roots of trees, shrubs, grasses, and vegetables; they remain inactive in cold weather; the female brings forth from 5 to 7 at a birth in the spring. In the region of the upper Missouri they are called muloes; the generic name of Rafinesque means "earth mouse," and that of Say "false mouth," the one indicating its burrowing habits, the other the capacious cheek pouches. They are common in Canada, and as far as lat.  $52^{\circ}$  N. The southern gopher, Georgia hamster, or salamander (*G. pinetis*, Raf.), is a large species, having a single deep groove on the upper incisors; the fore feet are longer than the hinder, the tail naked nearly to the base, and the color above plumbe-

ous brown, ashy white beneath; it is found in Alabama, Georgia, and Florida. Five other species are described by Mr. Baird in the "Report of the Pacific Railroad Expeditions," vol. viii., from the western states, Mexico, and Texas. There are several species of gopher, found principally on the Pacific coast of the United States, belonging to the genus *thomomys* (Maxim.), which differs from *geomys* in the nearly smooth anterior surface of the upper incisors, in the ovate crowns of the molars, less massive skull, and the fore feet being considerably shorter than the hind ones. The California gopher (*T. talpivorus*, Rich.) is the largest of the genus, though an inch or two less than the *G. bursarius*; the color above is reddish chestnut brown, with dusky tips to the hairs, paler beneath, and tail grayish white. It is very annoying to the farmer and horticulturist, and its destructive propensities have caused it to be baited with traps and poisons on all possible occasions; phosphorus and strychnine seem to be the most successful poisons.—The gopher tortoise (*testudo polyphemus*, Daudin) is about 15 inches long, and has a nearly flat shell, the plates marked with concentric striae disappearing in old age; the plastron is thick and firm, projecting beyond the carapace in front, and deeply emarginate behind; the head is short, thick, and obtuse, covered with plates; the eyes are large, with a dark iris; the jaws covered with horny, serrated plates; the neck short, and its skin granulated; the fore limbs very large and thick, compressed antero-posteriorly, with 5 fingers armed with strong nails; along the outer edge of the fore-arm is a row of projecting horny points; the hind limbs are short, thick, rounded, with 4 toes armed with strong nails. The general color is brownish yellow, with darker brown tints, the head almost black, the lower parts dirty yellow, and the limbs dusky. It is found in Florida, Alabama, and Georgia, but does not appear to go north of the Savannah river. Like the rodent gophers, they burrow in the ground, preferring such dry and sandy places as the pine barrens, where they exist in troops; they are gentle, living entirely on vegetable food; they are very fond of the sweet potato, and sometimes do mischief by destroying these, melons, bulbous roots, &c.; they generally seek their food by night; they are fond of basking in the sun, though they cannot bear its full summer heat, and cannot endure rain; they become torpid in winter. The adults are very strong, moving with a weight of 200 lbs., and the females are the largest; the flesh and the eggs are esteemed as food.

GORDIAN KNOT. See GORDIUS.

GORDIANUS, MARCUS ANTONIUS. I. Surnamed AFRICANUS, a Roman emperor, born in Rome, A. D. 157, died in Carthage in 238. He was descended on his father's side from the Gracchi, and on his mother's from the emperor Trajan, possessed more extensive estates than those of any other private citizen, was first made consul in 218, and was afterward pro-consul of Africa.

Distinguished for moral and intellectual excellence, a love of literature, and a diligent regard for the happiness of the people in his official administration, in his 80th year he was compelled by the leaders of the rebellion against the procurator of Maximinus to assume at Carthage the imperial title. The intelligence was welcomed by the senate, which at once proclaimed Gordianus and his son Augusti, and declared Maximinus a public enemy. Meantime Caspelianus, procurator of Numidia, who had recently been suspended by Gordianus, refused to acknowledge his authority, and marched with a well-trained army against Carthage. The younger Gordianus met him with undisciplined forces, and was defeated and slain, and his father thereupon died by his own hands, after a nominal reign of less than 2 months. II. Emperor of Rome, grandson of the preceding, born about A. D. 228, died in March, 244. He was proclaimed Cæsar at Rome after the death of the two Gordiani in Africa, was colleague of the two new emperors Balbinus and Maximus, and after their murder by the prætorians in 238 was proclaimed emperor by the senate and the troops. During a part of his reign he was supported by the abilities of Misithenus, whose daughter he married, and carried on a war against the Persians, whom he defeated in a series of engagements in Syria in 242. Misithenus died soon after, and was succeeded in command by Philippus, an Arabian, who, by raising discontent among the troops while they were advancing into Persia, caused Gordianus to be murdered, and himself proclaimed emperor in his stead.

GORDIUS, a legendary king of Phrygia, father of Midas. He was originally a peasant, but an eagle having alighted on his yoke of oxen while he was ploughing, and remained there till evening, this was taken as a presage of the future greatness of his house. To learn the meaning of the sign, he went to consult the soothsayers of Telmessus. A prophetess whom he met at the entrance of the place gave him the necessary information concerning the sacrifices, and afterward became his wife. When their son Midas had reached the age of manhood, the country was disturbed by civil dissensions, and an oracle declared that a car would bring the people a new king, and with him the end of their disturbances. While they were deliberating, Gordius with his wife and son unexpectedly appeared on a car in the assembly, and was hailed king. According to another tradition, Midas was elected king. The new ruler consecrated the yoke of his team to Jupiter the King in the acropolis of Gordium, and an oracle declared that whosoever should untie its artfully made knot would become master of Asia. Alexander, it is said, cut it asunder with the sword on his march to Persia. Some historians suppose the Gordian knot to have allegorically represented a strong confederacy of smaller states in Asia Minor.

GORDON, a N. W. co. of Ga., watered by the

Oostenaula river and several other streams; area, 330 sq. m.; pop. in 1852, 9,056, of whom 1,183 were slaves. It has a hilly surface, underlying which are beds of blue limestone. The soil is fertile, and yields grain, potatoes, grass, cotton, peaches, and grapes. The productions in 1850 were 285,360 bushels of Indian corn, 20,586 of oats, 81,016 of sweet potatoes, 184 bales of cotton, and 100 lbs. of rice. There were 800 pupils attending public schools. The Western and Atlantic railroad traverses the county. Taken from Cass and Floyd counties in 1849-'50. Value of real estate in 1856, \$1,872,510. Capital, Calhoun.

GORDON, GEORGE, commonly called Lord George Gordon, a British political agitator, born in London in Dec. 1750, died in Newgate prison, Nov. 1, 1793. He was the 8d son of Oosmo George, 3d duke of Gordon, and at a very early age entered the navy, from which he retired in 1772, on the pretext that his promotion had been neglected, but in reality, it has been supposed, through the machinations of the opposition in parliament, who wished to secure him as an adherent. At this period of his life he was remarkable for his personal attractions, his winning address, and happy facility of adapting himself to the tastes of all classes. The latter qualities were successfully displayed in an election in Inverness-shire in 1774, in which he successfully contested the representation of the county with an influential proprietor, Fraser of Lovat. By a compromise Gordon subsequently relinquished Inverness-shire and entered parliament for the borough of Ludgerhall. For a year or two he voted with the ministry, but in 1776 vehemently opposed them in a speech in which he alleged that an infamous attempt had been made to bribe him. So much use was made of this circumstance by Fox, Burke, and other leaders of the opposition, that the ministry subsequently endeavored to persuade him to resign his seat in parliament and accept the vacant place of vice-admiral of Scotland; an offer which he resolutely declined, notwithstanding that by accepting it he would have added very largely to his pecuniary resources. From this time he ceased to act with either whigs or tories, but spoke with so much effect upon the proceedings of either side, that it became a common remark that "there were three parties in parliament, the ministry, the opposition, and Lord George Gordon." In 1779 the proposition to procure from parliament an act for the relief of Scottish Roman Catholics, similar to Sir George Saville's act passed the previous year with reference to England and Ireland, caused an extraordinary excitement throughout England and Scotland; and in November a powerful society was organized in London under the name of the "Protestant Association," for the purpose of defeating the measure, of which Gordon was unanimously elected president. At the meeting of parliament in the spring of 1780 he presented a petition from Plymouth praying for a repeal of Sir George Saville's act;

but finding the government indifferent to the application, he convened a meeting of the association on the evening of May 29, and in an inflammatory harangue upon the encroachments and designs of the Roman Catholics, enjoined them to meet on the succeeding Friday (June 2) in St. George's fields and carry up their petition to parliament for the repeal of the act. On the day appointed a concourse of people, estimated at nearly 60,000 in number, assembled in St. George's fields, and after listening to a speech from their leader, accompanied him to the houses of parliament, which they completely surrounded, to the great personal danger of many members and the almost total interruption of legislative business. The house having refused to take the petition into immediate consideration, at several stages of the day's proceedings Gordon addressed the mob from the top of the gallery stairs, naming the members who had spoken against the measure, and protesting that "there would be no help for the Scottish people till all the popish chapels were destroyed." At a late hour in the evening they retired, but proceeded almost immediately to the chapels of the Sardinian and Bavarian legations, which they sacked. On Sunday, the 4th, they renewed their violence, and from the evening of that day until the morning of Thursday, the 8th, the city was almost entirely at their mercy, the authorities all the while showing an inertness which enabled the mob to gratify their passions without restraint. The prisons were broken open, the public buildings attacked, the houses of Lord Mansfield and of many Roman Catholics pillaged and burned, and at one time on the 7th 36 fires were raging within the limits of London. On the evening of that day troops began to pour into the city from all sides, and on the next afternoon the famous "Gordon" or "no popery" riots were finally quelled, after upward of 458 people had been killed and wounded by the military, exclusive of a number killed by accident. On the 9th Gordon was arrested by order of the privy council on a charge of treason, and committed to the tower. His trial came on in Feb. 1781, and the prisoner, owing to his eloquent and skilful defence by Erskine and Kenyon, was acquitted on the ground that his intentions in assembling the people were not malicious or traitorous. His credit, however, was thenceforth gone with all moderate persons, and his conduct became so eccentric and embarrassing to his friends as to justify the opinion that his intellect was impaired. In 1788 he was sentenced to several years' imprisonment and to pay heavy fines for having libelled the administration of criminal justice in England, and the queen of France. About the same time he became a proselyte to Judaism, the rites of which faith he submitted to with scrupulous exactness. He continued to send forth from his prison handbills and letters of an eccentric character, and petitioned the national assembly of France to procure his release, but without effect. He died of a deli-



rious fever, having been in all probability insane during the last 10 or 12 years of his life.

GORDON, SIR JOHN WATSON, a Scottish painter, born in Edinburgh about 1790. He received his professional education in Edinburgh, and during the greater part of his career has devoted himself exclusively to portrait painting. Among his sitters were Sir Walter Scott, Dr. Chalmers, De Quincey, Lord Cockburn, John Wilson, the earl of Aberdeen, &c. Since 1850 he has been president of the royal Scottish academy, and upon being appointed at the same time painter-limner to the queen in Scotland, he received the honor of knighthood. Since 1851 he has been a member of the London royal academy.

GORDON, WILLIAM, D.D., an English clergyman and author, for many years a minister of Roxbury, Mass., born in Hitchin in 1730, died in Ipswich, Oct. 9, 1807. After having been settled in the dissenting ministry in England, he removed to America in 1770, was ordained minister of the 8d church in Roxbury in 1772, became chaplain to the provincial congress of Massachusetts, and on the outbreak of the revolutionary war determined to write its history. He had recourse to the congressional and New England official records, obtained perusal of many original papers from the American generals, and, returning to England in 1786, published his "History of the Rise, Progress, and Establishment of the Independence of the United States of America" (4 vols., London, 1788).

GORE, CATHERINE GRACE, an English novelist, born in Nottingham in 1799. In 1823, soon after her marriage with Mr. Charles Gore, appeared her first novel, "Theresa Marchmont, or the Maid of Honor," said to have been written in a week. This was succeeded by "The Hungarian Tales," "Mothers and Daughters" (1831), and other works, after which she spent several years of comparative literary inactivity on the continent. From 1836, however, when her "Mrs. Armytage" was published, to within a very recent period, she has been an industrious and prolific writer, sometimes producing as many as 3 or 4 novels in a year. Some of these were published anonymously, but the greater part were acknowledged, and all have obtained a popularity, as pictures of fashionable society, more or less ephemeral. Among the most successful were "The Diary of a Désennuyée" (1836); "Preferment" (1839); "The Courtier of the Days of Charles II." (1839); "Cecil, or the Adventures of a Coxcomb" (1841), which displayed so intimate a knowledge of club life that it was long ascribed to a male author; "The Banker's Wife" (1843); "Pin Money;" "Peers and Parvenues" (1846); "Temptation and Atonement" (1847). Mrs. Gore is now a widow.

GORE, CHRISTOPHER, governor of Massachusetts, born in Boston in 1758, died in Waltham, March 1, 1827. He was graduated at Harvard college in 1776, and, studying law, was soon engaged in good practice. In 1789 he was appointed the first U. S. district attorney for

Massachusetts; in 1796 was chosen one of the commissioners to settle the claims of the United States upon Great Britain for spoiliations, and remained in London, successfully engaged in the duties of this office, about 8 years; in 1803 he acted as chargé d'affaires during the absence of the American minister; in 1809 was chosen governor of Massachusetts; and in 1814 was elected to the U. S. senate, where he served about 8 years. Having no children, he left the most of his property to Harvard college.

GORÉE, a small island belonging to France, on the W. coast of Africa,  $1\frac{1}{4}$  m. S. of Cape Verd, and separated from the continent by the strait of Decar; pop. 5,000. It is 8 m. in circumference, and is nothing more than a basaltic rock, which in some places is several hundred feet high. The fort occupies an elevated flat near the centre of the island, and the town a sandy plain at the foot of the rock. The roadstead is well sheltered, and affords safe anchorage for 8 months of the year. The climate is healthy.

GORGES, SIR FERDINANDO, lord proprietary of the province of Maine, born in Somersetshire, England, died at an advanced age in 1647. He was a partner in the conspiracy of the earl of Essex, against whom he testified on his trial in 1601. During the war with Spain he served in the navy, and after the peace, in 1604, was appointed governor of Plymouth. When Waymouth returned in 1605 from his voyage to North America, and brought with him 5 Indian captives, Gorges took 3 of them into his house, caused them to be instructed in the English language, obtained information from them of the "stately islands and safe harbors" of their native country, and determined to become a proprietor of domains beyond the Atlantic. He persuaded Sir John Popham, lord chief justice of England, to share his intentions, while at the same time influential persons in London were desiring to renew the attempts which had been made by Raleigh in Virginia. A joint application was arranged, and in 1606 the king incorporated two companies, the first called the London colony, and the second the Plymouth colony, between which was divided the territory extending 50 miles inland from the 34th to the 45th parallel N. lat. The Plymouth colony had the northern portion, which was styled North Virginia. An exploring ship commanded by Challons was sent out by Gorges, but was captured by the Spaniards. Three ships with 100 settlers sailed from Plymouth, May 31, 1607, and reached the mouth of the Kennebec in Maine, where they began a settlement, which was abandoned the next spring. In 1614 Gorges engaged Capt. John Smith, who had already visited North Virginia (which he was the first to call New England), in the service of the Plymouth company. He set sail for New England with 2 ships, in March, 1615, but his own was dismasted, and returned to port, and Capt. Dermer in the smaller vessel made the voyage, but soon returned. Other attempts

of Smith were unsuccessful, but in 1616 Gorges sent out Richard Vines with a party, which encamped on the river Saco through the winter, and in 1619-20 Capt. Dermer again made the voyage. The pilgrims had obtained their original patent from the London company, which had incurred the resentment of the king, so that in 1620 Gorges and his associates obtained a new incorporation for "the governing of New England in America," which was empowered to hold territory extending westward from sea to sea between the 40th and 48th parallels N. lat. From this council the pilgrims received a new patent, by which each colonist was to pay a yearly rent of 2 shillings an acre after 7 years. Gorges himself, pursuing his plans of territorial aggrandizement, united with John Mason in taking grants of the district called Laconia, bounded by the Merrimack, the Kennebec, the ocean, and "the river of Canada," and under his auspices several settlements were attempted. His son, Capt. Robert Gorges, was appointed in 1623 by the council for New England "general governor of the country." This council resigned its charter to the king in 1635, surrendering the administration of its domains to a governor-general to be appointed by him, and Gorges vainly expected this appointment. He now determined to establish a miniature sovereignty on his own domain. To this end he obtained from the king a charter constituting him lord proprietary of the province of Maine, with extraordinary governmental powers, which were to be transmissible with the property to his heirs and assigns. He was ruler in church and state, which were instituted on hierarchical and monarchical models, and he flattered himself that he had now attained "what he had travailed for above 40 years." He sent his son Thomas to be deputy governor, and the officers took an oath of allegiance to the lord proprietary. The province was divided into 2 counties, of which Agamenticus (now York) and Saco were respectively the principal settlements; the former received a city charter, as Gorgeana, in 1642. But the fatal want was a deficiency of subjects; probably two-thirds of the adult males were in places of authority; yet the little monarchy continued for nearly 10 years. When the 4 New England colonies formed a confederacy in 1643, the settlements of Gorges were excluded from it, "because," says Winthrop, "they ran a different course from us both in their ministry and their civil administration," and because the proprietary was then in arms in England for the king against the cause of the Puritans. On his death the people repeatedly wrote to his heirs, but as no answer was received, they at length formed themselves into a body politic for the purposes of self-government, and submitted to the jurisdiction of Massachusetts. "The nature of Gorges," says Bancroft, "was generous, and his piety sincere. He sought pleasure in doing good, fame by advancing Christianity among the heathen, a durable monument by erecting houses, villages, and towns."

GÖRGEY, or GÖRGEI, ARTHUR, a Hungarian general and dictator, born in Toporcz, in the county of Zips, Feb. 5, 1818, of a noble Lutheran family. Having gone through a course of study at the gymnasium of Eperies, he entered the military school at Tulin, and subsequently the royal Hungarian noble life guards at Vienna, and after a service of a few years was appointed lieutenant in the regiment of Palatine hussars. But he soon left the army to devote himself to chemical studies at Prague, where he married a young French lady, with whom he returned to his native county in the north of Hungary. Here he spent the spring of 1848 without any participation in the early events of the Hungarian revolution; but when the intrigues of the Vienna cabinet and the reactionary insurrections of the non-Magyar tribes in the south of Hungary had compelled the first Hungarian ministry (Batthyányi-Kossuth) to declare the country in danger, he offered his services to the national government. He received the rank of captain, and was attached to the 5th battalion of Honvéds, which was forming at Raab. He was soon after ordered to Pesth and intrusted with various commissions for procuring flint muskets, fuses, and percussion caps, and after his return from an official journey to Prague and Wiener-Neustadt in Aug. 1848, he was reappointed at his own request to the camp service, and received the command of the mobile national guard of the circle W. of the Theiss, with the rank of Honvéd major. His chief station was Szolnok. Detached to the island of Osepel, formed by the Danube, to defend that line against the Croats of Ban Jellachich, he evinced an almost ostentatious revolutionary rigor by the execution of Count Eugene Zichy, who was brought before him as an accomplice of Jellachich, tried by a court martial, condemned, and hanged (Sept. 30). The ban having been defeated at Pákozd, and having fled toward Vienna, Görgey operated with Perczel against the thus abandoned Croatian corps under Roth and Philippovich, which finally surrendered at Ozora (Oct. 7). The great merit of the young officer in this successful operation, his energy, resoluteness, and ability, made Kossuth, then at the head of the committee of defence, overlook the stubborn independence of his superiors which he already displayed, and detaching him from Perczel, with whom he had quarrelled, he sent him as colonel to the army of the upper Danube, which, pursuing Jellachich, was about to cross the frontier for the deliverance of Vienna. Not fully confiding in the chief commander, Mőga, Kossuth intrusted Görgey with the command of the vanguard, and after the defeat at Schwechat, near Vienna (Oct. 30), which decided the fate of that capital, made him general-in-chief of the whole army, which was charged with defending the frontier. Görgey's force, however, consisting mainly of unorganized militia, already dispirited by defeat, was unfit to maintain a long line of defence against the superior and victorious army of

Prince Windischgrätz, and was threatened at the same time on both flanks by the simultaneous advance of Simunich and Nugent. Having restored order by rigorous measures, and the courage of his troops by a few skirmishes, he abandoned the frontier on the approach of Windischgrätz (Dec. 16), giving up the hastily established defensive works at Presburg, and subsequently those of Wieselburg and Raab, and retreated on the high road leading along the right bank of the Danube toward Buda, being closely followed by the enemy. This march was interrupted only by the unimportant engagements at Wieselburg (Dec. 18), Bâbolna (Dec. 28), and Tétény in the vicinity of the Hungarian capital (Jan. 3, 1849). This, too, was now given up, in spite of the encouraging issue of the last engagement, chiefly in consequence of the rout of Perczel's corps, which on its retreat from the line of the Drave had been surprised and dispersed at Moor (Dec. 29) before its junction with Görgey. According to a new plan of operations adopted in a council of war held at Pesth, Görgey, giving up a part of his troops to Perczel, who had to defend the Theiss in the direction of Debreazin, the new seat of the Hungarian government, crossed the Danube at Pesth, with the principal part of his corps, and marched along the left bank of this river, toward the Waag. His object was to divert the main army of the enemy by threatening its rear, from a decisive march toward the Theiss, to deliver the fortress of Leopoldstadt on the Waag, and to drive back Simunich, who was operating on that line. The task was arduous, and the ambitious young general felt that he held the fate of his country in his hands. He was determined to save its military honor, but he had neither hope nor sympathy for its national independence. His thoroughly German education, and his almost exclusively German associations in the higher ranks of the army, made him a stranger among his countrymen, of whose history, literature, and even language he knew but little. A strong will, incapable of subordination, a proud conviction of his own superior abilities, and a superciliously sarcastic turn of mind, made him inclined to despise popular agitations, public opinion, and democratic ideas, and to scorn every measure of the revolutionary leaders of Hungary, and especially of Kossuth, who owed his dictatorial power to eloquence, democratic enthusiasm, and popular sympathy. Of principles he knew but one, that of military honor. Military glory, more than power, was the aim of his ambition. But what he was the most anxious about was complete personal independence. He had scarcely reached with his army the first isolated position at Waitzen, when he gave vent to his feelings, and at the same time defined his position by a manifesto in the form of a "declaration of the royal Hungarian *corps d'armées* of the upper Danube," of which the chief points, directed at the same time against the new, unconstitutional reign of Francis Joseph, who had been declared emperor

at Olmütz on Dec. 2, 1848, and against the republican tendencies of Kossuth, were the following: "1. The *corps d'armées* of the upper Danube remains faithful to its oath to fight resolutely against every external enemy for the maintenance of the constitution of the kingdom of Hungary sanctioned by King Ferdinand V. 2. With the same resolution the *corps d'armées* of the upper Danube will oppose itself to all those who may attempt to overthrow the constitutional monarchy by untimely republican intrigues in the interior of the country. . . . 4. The *corps d'armées* of the upper Danube, mindful of the oath taken to the constitution of Hungary, and mindful of its own honor, having remained perfectly conscious of what it has to do and is determined to do, declares, finally, that it will adhere to the result of any convention made with the enemy, only provided on the one hand that it guarantees the integrity of the constitution of Hungary to which the *corps d'armées* has sworn, and on the other, is not inimical to the military honor of the *corps d'armées* itself." This proclamation, which had the merit of appeasing the scruples of the old troops, formerly Austrian, startled the committees of defence and the nation by the mention of a convention with the enemy; and all the subsequent services of the general, who seemed thus preparing to play the part of another Monk, could not free him from the general suspicion of meditated treason, accompanied as they continually were by acts of flagrant disobedience to the revolutionary government. He was, however, protected by the various perplexities of the government, by his isolated situation, and the sympathies of his army. But his situation was not less critical than that of the government. On Jan. 10 both his vanguard, under Aulich, and his rear guard, under Guyon, had to fight, the former against the vanguard of Simunich, at Verebély, and the latter against that of the pursuing column under Chorich, at Ipolyság. The army, consisting of about 15,000 men, was soon hemmed in, in the midst of winter, among the mountain towns of the mining district between the Gran, Danube, and Waag, where the hostile corps of Chorich, Götz, Simunich, and Schlick surrounded them from every quarter. The offensive march westward was given up, Leopoldstadt abandoned to the besieging enemy, and a bold retreat toward the upper Theiss commenced, through rugged mountains, across overflowing streams, and amid continual fighting. After the defeat of Guyon at Windschacht (Jan. 21), and of Görgey at Hodrics, where he was left alone (Jan. 22), all the 3 divisions of the army were on the brink of destruction, and all escaped as by a miracle, effecting their junction at Nensohl. They owed their escape more to the intrepidity of the leaders, Görgey, Aulich, and Guyon, than to the valor of the soldiers, who were in great part undisciplined recruits. Separating again, they marched toward the northernmost Hungarian region of the Carpathians, and entered the

Zips, Görgey's native county, at the beginning of February. Having here been surprised at Iglo on the night between Feb. 2 and 3, and suffered some inconsiderable loss, Guyon soon after (Feb. 5) saved the army by his signal victory on Mount Branyazkó over a division of Schlick's corps, which opened a junction with the Hungarian corps under Klapka operating against an Austrian general on the upper Theiss. Görgey, who had systematically neglected the difficult communication with the government at Debreczin, and contemptuously disbelieved the non-official reports of the successful operations of Klapka, too late concerted with the latter a common plan of attack, and thus missed the opportunity of crushing Schlick's corps at Kaschau. Arrived in that town, Görgey received an order from the government placing him, like Perczel and Klapka, under the Polish general Dembinski, as commander-in-chief of the united Hungarian main army; the corps of the upper Danube received the name of 7th corps. Görgey obeyed reluctantly, but immediately began intrigues in his camp against the foreign generalissimo, which much deranged the offensive plans of the latter. Dembinski doubted the fidelity of Görgey; the latter had no confidence in the ability of his superior. The unfavorable issue of the two days' battle of Kápolna (Feb. 26, 27) was ascribed by the one to unskilful dispositions, by the other to treacherous slowness in execution. The events which followed the retreat to Kövesd and the unimportant battle fought at that place (Feb. 28), as well as his own conduct, are thus characteristically described by Görgey in the contents of the 80th chapter of his memoirs (vol. i.): "Dembinski decrees the retreat beyond the Theiss. Klapka effects it with his divisions (March 2). I delay the retreat of the 7th army corps. Reasons for it. Dembinski countermands the retreat of the 7th army corps. My written declaration against it. I effect the retreat (March 3)." In *Füred-on-the-Theiss* the chief officers of the army, mostly partisans of Görgey, openly declared their want of confidence in Dembinski; the government was forced to yield, and after a few weeks of interregnum, during which Gen. Vetter had the nominal chief command, Görgey was appointed general-in-chief of the united main army, which was again to take the offensive against Windischgrätz. Crossing the upper Theiss, he began his march on the line of operation chosen by Dembinski, but with different success. The whole campaign was an uninterrupted series of victories. The battle of Hatvan (April 2), Bicske (4th), Izsaszeg (6th), Waitzen (10th), Nagy-Sarló (19th), and before Comorn (Ács, 26th), won mostly through the undaunted valor of Damjanics and his division, destroyed the finest imperial troops in Hungary, freed Pesth, and rescued the fortress of Comorn. The road to Vienna was open, but Buda had still to be conquered. Görgey undertook the latter task, but when he had executed it (May 21) the Russian

armies were already approaching the frontiers of Hungary, and the opportunity of striking a decisive blow at Austria in its capital was lost. (See BUDA.) Imitating the celebrated report of the conqueror of Praga to Catharine II: "Hurrah! Praga! Suwaroff," he announced his conquest to the government in Debreczin with the words: "Éljen! Buda! Görgey!" Kossuth, in his turn, imitated the "Bravo, field marshal! Catharine" of the Russian empress, by conferring on Görgey the title of lieutenant field marshal. This Görgey refused to accept, as incompatible with republican simplicity, thus ridiculing the republican policy of Kossuth and Szemere, the new prime minister. It was against that policy of republican independence, as sanctioned by the declaration of the Debreczin diet on April 14, as well as Kossuth's favorite scheme of "making Poland free, that Hungary might remain and Europe might become so" (Görgey's memoirs, vol. ii. ch. xii.), that the energies of Görgey were at that period chiefly directed. Having strengthened his personal position by assuming also the duties of minister of war, and by the removal from his army of some of the most independent and ablest of his generals, he recommenced the offensive against the Austrians simultaneously with the invasion of the Russians. Political rather than strategical reasons led him to choose the left bank of the Danube as a basis of operations, rejecting the repeated advice of Klapka to the contrary, and he changed his plan only after a series of bloody and fruitless struggles on the Waag and Danube (June 16, 20, 21). On the right bank of the latter river his army was forced to give up Raab (June 28), and he was obliged to retreat into the fortified camp at Comorn, where he gained more glory than success in the great battle of Szőny (July 2), in which he was wounded. At this juncture, when Russians and Austrians were advancing from every quarter, a concentration of the main armies on the Theiss was resolved upon at Pesth; Mézáros received the nominal, and his friend Dembinski the virtual command in chief; the capital was again evacuated, and Görgey was finally compelled to sacrifice his plans. Leaving a part of his army under Klapka at Comorn, he retreated toward Waitzen, where he fought (July 15) with distinction against the Russian main army under Paskevitch; but being unable to break through it, he took his direction toward the upper Theiss, this time in the middle of a hot summer, defeated the Russians on the Sajó (July 25) and on the Hernád (July 28), and crossed the Theiss at Tokaj, but not before the Russians had crossed it at Füred. The division of Nagy-Sándor was soon after surprised and defeated at Debreczin (Aug. 2); and when Görgey finally reached Arad, the last appointed place of concentration, as well as the last seat of the Hungarian government, his army alone was still able to fight, all the others which had been ordered there having been defeated and dispersed; Bem had even lost Transylvania. To resist with success the overwhelming forces

of Paskevitch and Haynau, which surrounded him, was now impossible, and he immediately resolved to prevent a protracted and perhaps shameful agony of the bleeding country by an act which he knew would brand his name before the world with the infamy of treason. Having summoned Kossuth to resign, he received from him (Aug. 11) supreme civil and military powers, and with the consent of his chief officers informed the Russian general Rüdiger of his intention to surrender his army at discretion to the commanders of the czar. In his letter he appealed to the magnanimity and love of justice of the latter in behalf of the nation and his fellow officers, excepting his own person, expressed his determination to surrender only to Russian troops, and indicated his line of march for the next few days, in order to be separated by Rüdiger from the Austrians, whom he was still resolved to repulse if he could not avoid meeting them. The last commands were executed by the army, which had so long been victorious, in silent despair. The march to Világos, the place of surrender, was "unusually retarded by the oppressive sultriness of the atmosphere; the sky was unclouded and not a breath of air stirring; beside, they had nothing more to lose." When the last division arrived, the sun was just setting; "and in the twilight of Aug. 13, 1849, General Count Rüdiger inspected the surrendered army," about 20,000 infantry and 2,000 cavalry, with 180 cannon. "The cavalry were dismounted, and had their swords hung on the pommels of their saddles; the muskets of the infantry were piled in pyramids; the artillery was drawn close together and unmanned; the flags and standards lay there unprotected before the disarmed ranks." The flags and standards were carried as trophies to Moscow; the generals and soldiers were delivered to the Austrians, the former to be executed at Arad (Oct. 6), the latter to serve a new term in their army. Görgey alone was spared at the intercession of the czar, and carried as captive to Klagenfurth in Carinthia, where he is still detained. Of his two brothers, who served with distinction under him, one was sentenced to imprisonment, the other to serve in the army. In Klagenfurth, where he also resumed his chemical studies, Görgey composed his memoirs in German, which were published under the title of "My Life and Acts in Hungary in the Years 1848 and 1849" (2 vols., Leipzig, 1852; English ed., 2 vols., London, 1852). This work is intended to vindicate his course during the war.

GORGIAS, a Greek rhetorician and sophist, born in Leontini, in Sicily, about 487 B. C., died about 380. He was a disciple of Empedocles and Prodicus, and first appears in history in 427, when he was sent to Athens to beseech succor for the Leontines attacked by the Syracusans. He not only captivated by the splendor of his eloquence the Athenian populace, but gained Alcibiades, Alcidas, Æschines, and Antisthenes for pupils or imitators. Plato gave

his name to the dialogue which he composed against the sophists.

GORGONS, three sisters, daughters of Phorcys and Ceto, who had according to the fable but one eye in common, and changed into stone whosoever they looked upon. Homer mentions but one gorgon, which appears as a hideous phantom in Hades, and whose head, of frightful aspect, was represented on the ægis of Athena. Hesiod mentions three, Stheno, Euryale, and Medusa, who had hissing serpents for hair, brazen claws, short wings, and a single tusk-like tooth. They were placed in the garden of the Hesperides near the realm of night, where they were slain by Perseus. Virgil places the gorgons with the harpies and other monsters at the gate of the palace of Pluto.

GORILLA, the largest of the anthropoid apes, a native of the equatorial region of western Africa, and first introduced to the scientific world by Dr. T. S. Savage in 1847. There were vague reports by voyagers and travellers of the existence in Africa of a quadrumanous animal larger than the chimpanzee, and there were in museums portions of a creature since ascertained to be the gorilla; but naturalists had their attention first called to it by the paper by Dr. Savage in vol. v. of the "Boston Journal of Natural History," in which he described the external characters and habits, and Prof. Jeffries Wyman described 4 crania and several parts of the skeleton. Since then Prof. Owen has described the skeleton in vols. iii. and iv. of the "Transactions of the Zoological Society of London" (1849-'53); a description of a large skeleton is given in vol. vi. of the "Boston Journal" above alluded to (1852). In France, Duvernoy wrote on the anatomy of the gorilla in vols. xxxvi. and xxxvii. of the *Comptes rendus de l'Académie des sciences* (1853); and Isidore Geoffroy St. Hilaire has contributed a very full account of its habits, osteology, and comparative anatomy in vol. x. of the *Archives du muséum d'histoire naturelle* (1858). The reader is referred to these papers for details of great interest on this remarkable animal. Dr. Savage described it as *troglydites gorilla*; Prof. Owen called it *T. Savagei*, retaining it in the same genus with the chimpanzee; Geoffroy St. Hilaire established for it the genus *gorilla* in 1852, and in 1858 gave it the name of *G. gina*, which is the best known, though *G. Savagei* has a prior claim. The common names of the gorilla among the natives of the region where it is found are *engeena*, *geena*, and *engeela*. There are specimens of the animal, more or less complete, in the collections at Philadelphia, Boston, London, and Paris; and Mr. Paul B. Du Chaillu, who returned to the United States in Aug. 1859, from the country about the Gaboon river, brought with him several complete specimens, male and female, both skins and skeletons, in excellent preservation. They were among the fruits of 4 years' travel in that region, undertaken chiefly with a view to discoveries in natural history. Mr. Du Chaillu is the first white man who has

killed a gorilla with his own hand, or who has had an opportunity of studying its habits in its native forests.—The skull of the male is longer and wider, but less heavy, than that of man, and the capacity of the cavity which contains the brain is less than one half of that of the most degraded human races; the outline of the face is straight from below the superciliary ridges to the edge of the incisive alveoli, and the facial angle (including these ridges) is about 30°. The most striking peculiarity is the great development of the interparietal and occipital crests and the ridges over the orbits, which give an angular outline to the skull, resembling the orangs in the first and the chimpanzee in the latter character; there is a great thickness of the orbital walls, with much space between the orbits, and a prominence on the inner wall directed outward; a noteworthy character is the coalescence of the nasal bones above, with a median suture on their lower half, the upper portion ascending above the nasal processes of the superior maxillary and becoming contracted between them, slightly projecting as in man; the crests are much less in the female. The cranial crests, wide zygomatic arches, and massive lower jaw, give indication of the powerful muscles whose action is so fatal to its enemies. The dental formula is the same as in man and the higher quadrumana; the canines are enormous, the incisors very wide, the lateral ones being more pointed, and the lower molars have 5 tubercles instead of 4; the sutures in both sexes become early obliterated. The bones of the trunk and extremities are remarkable for their size and strength; the length of the cervical spines is such that the nape is more prominent than the back of the head; the scapulae and bones of the arm indicate the attachment of muscles in comparison with which man's seem like those of a child. The expression of the face is scowling and extremely forbidding on account of the supra-orbital ridges and their thick integument; the nose is very flat and widely open; the ears are small; the eyes are much sunk in the head, and the lashes are short and thick; the brain cavity is elongated and ellipsoidal, and placed almost entirely behind and not above the face; the mouth is very wide, the lips large and thin, the lower one pendulous and very movable, the chin short and receding, and the whole muzzle prominent; the face is transversely wrinkled and black. The chest is capacious, the shoulders very wide, and the abdomen everywhere projecting. The limbs are greatly developed and of immense strength; the arms are longer than in the chimpanzee, reaching far down the leg, but not to the ankle as in the orang; according to Owen ("Proceedings of the Zoological Society," Jan. 11, 1859), whose observations are generally confirmed by the specimens of Mr. Du Chaillu, the arms do not extend so low as the knee; while the arm and fore-arm are longer than in the chimpanzee, the hand is shorter, wider, and more human in its carpal and metacarpal portions

and the lateral position of the thumb; from the length of the palm the fingers appear short and thick and as if swollen; they are also less free, as the posterior portion of the 8 intermediate fingers is covered by the undivided integument. There is very little appearance of wrist, the circumference at this part being twice that of a strong man's; the fingers taper to a point, are not arched, and the nails are flat and relatively small; the fingers are about twice the circumference of man's, and the skin of the middle joint is callous from the habit of the animal of applying these surfaces to the ground when it adopts a favorite way of progression by swinging its body forward supported by and between the hands; the thumb is short, and not more than half the size of the fore finger. The posterior extremities are occasionally used alone in standing and in progression; the thigh is relatively short, and of a nearly uniform size, in its middle portion not surpassing in circumference the same part in man; the leg increases in thickness from below the knee to the ankle; the tendinous portion of the muscles is developed more than the fleshy, with a great gain in strength. The foot is longer than the hand, and is human-like also in having the 8 intermediate toes about the same length, and partly united at their base by the integuments; the gorilla is essentially quadrumanous, and the posterior thumbs are largely developed, widely separated from the toes, to which they are easily opposed, and well calculated for prehension. The genus *gorilla* was established by Geoffroy St. Hilaire on the following characters principally: the head rounded in the young, very much elongated and depressed in the adult, with very prominent cranial crests; the peculiar conformation of the organs of sense, above detailed; the gigantic size; the proportions of the limbs, and the characters of the hands and feet; and the peculiarities of the teeth. It seems sufficiently distinct from *trogodytes niger*. It is not easy to determine the precise position of the gorilla in the quadrumanous series; in the structure of the hand and foot it comes nearer to man than the chimpanzee does; in the canines it would seem to be below even the orang; and in the proportions of the arm and fore-arm it is below the chimpanzee. The very indefiniteness of its position is another argument for its separation as a genus among the quadrumana. In Prof. Owen's last paper, above cited, the gorilla is retained in the genus *trogodytes*, and is ranked as the highest of the anthropoid apes. The adult male gorilla is from 5 to 6 feet high in its natural altitude, though after death it may be stretched beyond this; most specimens are under 6 feet, on account of the relative shortness and generally flexed position of the legs; it far surpasses man in the dimensions of the head, neck, body, and arms, and in the width of the shoulders; some are said to measure from 7 to 9 feet from the end of one outstretched hand to that of the other; one of

Mr. Du Chaillu's specimens measures 8 feet 11 inches. The general color of the hair, which is coarse and about 2 inches long on the arms, one inch on the belly, and quite short on the back and legs, is gray inclining to black. There is a black stripe about 2½ inches wide extending diagonally down the sides from behind the shoulders to the belly, which is entirely black. On the upper portion of the back the hair is very thin; old ones are bare in that part. On the arms the hair is black, and reversed from the wrist to the elbow; the chest is nearly bare; there are a few white hairs in the anal region; the face, hands, and feet are black; the hands are hairy as far as the division of the fingers, the palms naked and callous; the head has generally a reddish tint; on the whole the male would be called grayish and the female blackish. The young differ greatly from the adults in the shape of the head, and the females are less ferocious looking as well as much smaller than the males.—The gorilla is found on the W. coast of Africa, both N. and S. of the equator, but especially in the wooded districts of the interior near the head waters of the Gaboon river, and along the Muni river as far N. as the Crystal mountains. It is principally an inhabitant of the woods, but though the structure of its 4 hands seems well adapted to climbing on trees, it is very rare that a female or a young male is seen on them—the old males never; its favorite mode of progression is on all fours, in a shuffling manner and rolling from side to side, but with its head always erect and its face looking forward; on account of the greater length of the arms it stoops less than the chimpanzee, and is fond of thrusting these forward, with the flexed fingers on the ground, and of giving its body a half jumping, half swinging motion forward between them; when it assumes the erect posture, it flexes the arms upward or crosses them on the nape in order to counterbalance the tendency of the trunk to fall forward. Gorillas are generally seen in troops of 5, 4 females and one male, but the old males are occasionally met wandering alone; though living in the same neighborhood as the chimpanzees, they do not associate with them. Their strength is enormous, not only in the jaws, which are able to crush the barrel of a musket, but in the hands and feet, which they use in common with their canines in attack and defence; they are able to break with ease trees 3 or 4 inches in diameter. They are exceedingly ferocious, generally attacking man and animals intruding upon their haunts; if wounded, they are more terrible than the lion, and in this event the hunter's death is sure and speedy if his hand trembles or his gun misses fire. They approach the enemy standing, advancing a few steps at a time, pausing to beat their breasts with both hands, and roaring terribly. When near enough, they spring upon him, and destroy him with their powerful hands. One of Mr. Du Chaillu's men was eviscerated by a single blow. The story of their carrying clubs is untrue. They

are perfectly untamable, in this respect differing from the chimpanzee, which, in youth at least, appreciates kind treatment. When living in troops they are shy and difficult to approach, but when mated or alone they almost invariably offer battle, and are then the most terrible of animals. When living near villages, they sometimes come at daybreak to eat the plantains and sugar cane of the natives; beside these they eat nuts, berries, fruits of the oil palm and banana, the acid pulp of the *amomum*, the white portions of the leaves of the pineapple, and roots. Unlike the chimpanzee, the gorilla makes no shelter for itself. In intelligence it is considerably inferior to the chimpanzee. It exhibits great fondness for its young, of which it has one at a time. The reports of its visiting villages and carrying off negroes into the woods are mere fables. It is generally mute, but sometimes amuses itself by a sort of roaring, which, beginning low, increases till the forest echoes with its reverberations. When about to attack its enemies it gives a terrific yell, which resounds far and wide, giving warning of danger to the females and young, and likely to terrify the hunter unaccustomed to it. Some of the natives regard the gorillas with superstitious reverence, considering them as degenerate human beings, or as brutes into which the souls of bad men have entered; those who look upon them in this light never attack them, fully persuaded that no human agency can harm them; some tribes use the gorilla skulls and especially the brains in making charms to be employed to secure success in hunting. When Mr. Du Chaillu killed one, he had great difficulty in preventing his assistants from breaking the skull to take out the brain. The negroes of the interior are very fond of eating the flesh of gorillas, as of chimpanzees and monkeys, whenever they can obtain it; when smoked, it is considered by them a most dainty dish. The taking of a gorilla is an occasion of joy in their villages, and the lucky hunter is surrounded by friends anxious for their share; the chief has a right to the best piece. Among the coast tribes, on the other hand, it is considered an abomination to eat the flesh of either the gorilla or the chimpanzee, on account of their resemblance to man.

GORITZ, or GÖRITZ (Germ. *Görz*), a town of Illyria, 22 m. N. N. W. of Trieste, on the Isonzo; pop. 12,200. It consists of two parts, an upper or old town, and the lower or new town. The upper is fortified, and contains the castle of the counts of Görz. The principal manufactures are leather, sugar, and silk.

GORKHAS, the dominant people of Nepal in Hindostan. Little is known of their history until about 1768, when, having consolidated or conquered the petty independent tribes among whom Nepal was parcelled out, they found themselves masters of the whole of that country, and eventually of almost the entire alpine region, as it is called, of northern India. Having invaded Thibet in 1790, they were defeated by the Chinese, to whom the lamas had applied

for assistance, and during a short period they remained in nominal subjection to the celestial empire; but in 1792 their independence was recognized by a commercial treaty with the E. I. company. A few years later they were involved in a war with the British. (See NEPAUL.) The Gorkhas are of Mongol origin, but smaller and darker than the Chinese. They are seldom over 5 feet high, are hardy, active, enduring, unrivalled soldiers, and utterly insensible to danger. They form a valuable portion of the native troops enlisted in the British army, and won the enthusiastic praise of the English officers by their uniform fidelity during the sepoy revolt of 1857-'8, and their services in the field, particularly during the Delhi campaign. They are Hindoos in religion, but unlike Hindoos in appearance, manners, customs, and freedom from caste prejudice.

GÖRLITZ, a town of Prussian Silesia, situated on an eminence which overhangs the left bank of the Neisse; pop. 25,500. It consists of the inner town, which is surrounded with walls having 11 gates, and the suburbs. The manufactures are linen and woollen cloth, tobacco, starch, &c. Görlitz was a city of great importance in the 3 centuries preceding the reformation.

GÖRRES, JAKOB JOSEPH VON, a German publicist and author, born in Coblenz, Jan. 25, 1776, died in Munich, Jan. 29, 1848. Few young men in Germany greeted the outbreak of the French revolution with such enthusiasm as Görres. He gave up the study of medicine in order to devote himself entirely to politics. His first work, *Der allgemeine Friede, ein Ideal* (1796), shows an intense love of republicanism. A periodical, *Das rothe Blatt*, which he commenced in the 6th year of the republic, was discontinued in consequence of his uncompromising boldness. He transformed it into the *Rübezahl im blauen Gewande*, which for the same reason had but a short existence. At this time the views of Görres began to become less radical. In 1799 the Rhenish provinces of Germany placed him at the head of a deputation to Paris, which was to study the real state of affairs in the French capital, and attempt a union with France. He arrived a few days after the revolution of the 18th Brumaire, which placed the reins of power in the hands of Napoleon, who did not find time to receive the deputation. Görres returned from Paris with the belief that in the reign of Napoleon a tyranny was growing up, such as the world had not seen since the time of the Romans. In 1800 he gave an account of his mission in the work *Resultats meiner Sendung nach Paris*. He now retired from public and political life, and devoted himself entirely to the study of history and literature. Having been appointed, Nov. 5, 1799, professor of natural sciences at the college of Coblenz, he published several philosophical works, all penetrated with that strong idealism which then reigned in the philosophy of Germany. In 1806 he went to Heidelberg,

where he lectured at the university. In conjunction with Clemens Brentano and Achim von Arnim, he now published *Die deutschen Volksbücher* (Heidelberg, 1807), and edited the *Einsiedlerzeitung*. Having returned to Coblenz in 1808, he published several works on the history of Asiatic myths and the German literature of the middle ages. After the overthrow of the French empire, he established in 1814 the *Rheinische Mercur*, whose principal aim was to awaken in the whole people a desire of a restoration of the German empire. Napoleon is said to have called this journal the 6th great power of Europe. The Prussian government suppressed it in 1816. To escape arrest in consequence of his *Deutschland und die Revolution* (Coblenz, 1820), in which he warned the princes that a restoration of the former political state, without God and the Catholic church, would lead to new revolution, he fled to France and Switzerland. In 1821 he published at Stuttgart *Europa und die Revolution*, and in 1822, *Die heilige Allianz und die Völker auf dem Congress zu Verona*. In 1827 he was appointed professor of history in the university of Munich. Having always been inclined to mysticism, he began to collect materials for a history of the Christian mystics, which work he completed in 1842 (*Die Christliche Mystik*, 4 vols., Ratisbon, 1836-'42). But once more the political arena allured him, when in 1837 the Prussian government ordered the arrest of the archbishop of Cologne. He published his *Athanasius* (Ratisbon, 1837), a work of almost unprecedented influence on the Catholic part of Germany. It was followed by *Die Triarier* (Ratisbon, 1838), *Kirche und Staat nach Ablauf der Kölner Irrungen* (Weissenborn, 1842), and the *Wallfahrt nach Trier* (Ratisbon, 1845), all of which are classed among the most important productions of Catholic literature in the present century. The establishment of the *Historisch-politische Blätter*, one of the leading Catholic periodicals of the world, was principally his work, and he frequently contributed to it. In the literary controversy called forth by Strauss's "Life of Jesus," he took part in a long introduction which he wrote for the *Leben Christi*, by Dr. Sepp, one of his favorite pupils. To his aspirations for a political union of Germany he gave vent once more in his work, *Der Kölner Dom und der Strasburger Münster* (Munich, 1844). In 1845 he was elected a member of the academy of sciences at Munich, on which occasion he published treatises on *Die Japhetiden und ihre gemeinsame Heimat Armenien* (Munich, 1844), and *Die drei Grundwurzeln des keltischen Stammes in Gallien* (Munich, 1845), both of which were regarded as fragments of a comprehensive universal history (*Welt- und Menschengeschichte*), the completion of which was, however, prevented by his death. An edition of the complete works of Görres was commenced in 1854 by his daughter Marie Görres, of which 6 vols. had been published in 1859.

GORRESIO, GASPARO, an Italian scholar and



linguist, born in Bagnasco, June 20, 1808. After being educated at Mondovi and Turin, he went to Germany, where he studied criticism, philosophy, and history. In 1832 he was appointed professor of history at Turin, was soon after elected a member of the faculty of the university, and published various works on the origin of mythology, the method of interpretation, the poetry of Pindar, and researches on the affinity of the Greek, Latin, and German languages. He devoted himself for many years, in Italy, Paris, and London, to an edition of the *Ramayana*, the oldest of the Indian epics (1842 *et seq.*). It contains not only the Sanscrit text and an Italian translation, but also prefaces and notes summing up the historical, philosophical, and religious elements of the time when the epopee had birth. He has since been engaged in preparing a similar edition of the *Mahabharata*.

GORTCHAKOFF, a princely Russian family of ancient origin, several members of which have distinguished themselves in the history or literature of their country. I. PETR, commander of Smolensk, is celebrated for his defence of that place against the army of Sigismund III., king of Poland, in 1609-'11, when it was taken by assault. II. DMITRI, born in 1756, won a place among the poets of Russia by his odes, satires, and epistles, and died in 1824. III. ALEXANDER, born in 1764, served under Suwaroff against the Turks, the Poles under Kosciuszko, and the French in the campaign of Switzerland, and subsequently with great distinction under Benningsen in the campaign of 1807, when he defeated Lannes at Heilsberg and fought at Friedland, acted as chief of the war ministry in 1812, was appointed general of infantry, and died in 1826. IV. ANDREI served as major-general under Suwaroff in 1799, commanded a division during the French invasion in 1812, when he distinguished himself in the battle of Borodino, and the 1st corps of infantry in 1813-'14, left the army in 1828, and died in 1855. V. PETR, son of Dmitri, born in 1790, entered the army at an early age, fought against Napoleon in the campaigns of 1807 and 1812-'14, served under Yermoloff in the Caucasus, and distinguished himself in the war against Turkey in 1828-'9, when he signed the peace of Adrianople, was made governor-general of western Siberia in 1839, and general of infantry in 1843, and retired from service in 1851. VI. MIHAIL, brother of the preceding, born in 1792, served against the French in the campaigns of 1807 and 1812-'14, against the Swedes in 1808-'9, and against the Turks in 1828-'29, when he led the sieges of Shumla and Silistria, distinguished himself in the war of the Polish revolution (1831) at Grochow, Ostrolenka, and the taking of Warsaw, was made general of artillery, and, in 1846, military governor of Warsaw, where he subsequently often acted as lieutenant of Prince Paskevitch, whom he also accompanied on the invasion of Hungary in 1849. In 1853 he received the command of the army of invasion sent to the Danubian principalities, ceded it soon

after to Paskevitch, and took it again after the raising of the siege of Silistria, led the retreating army to Bessarabia, and in 1855 was appointed commander-in-chief in the Crimea and southern Russia, suffered defeat on the Tchernaya, but greatly distinguished himself by the gallant defence of Sebastopol, as well as by the skilful retreat to the North fort after the fall of the fortress. In 1856, after the death of Paskevitch, he was appointed governor of Poland by Alexander II., in the execution of whose conciliatory measures in regard to that country he is now engaged. VII. ALEXANDER, brother of the preceding, born about 1800, chose the diplomatic career, acted as secretary of legation, chargé d'affaires, extraordinary or ordinary ambassador at London, Florence, Vienna, Stuttgart, Frankfurt, and again in 1854 and 1855 at Vienna, and was appointed in 1856 minister of foreign affairs at St. Petersburg, which office he still holds (Sept. 1859).

GORTON, SAMUEL, a New England enthusiast, and the first settler of Warwick, R. I., born in Gorton, England, about 1600, died in Rhode Island in Nov. or Dec. 1677. He was never at college, but seems to have been passably well educated. He did business in London as a clothier until 1636, when he embarked for New England, and settled at Boston. Religious disputes induced him to remove to Plymouth, where we first hear of him as a preacher. Though bred in the church of England, he soon exhibited such peculiar views that he was banished from the colony on a charge of heresy. With a few followers he then went to Aquetneck or Rhode Island, which had recently been settled by exiles from Massachusetts Bay; but falling again into trouble, was publicly whipped for calling the magistrates "just asses" and for other contemptuous acts, and was forced to seek an asylum with Roger Williams in Providence, about 1641. Here, after "bewitching and bemadding poor Providence," as Williams writes, he became involved in the disputes of the colonists on certain questions of boundary, and made himself so obnoxious to some of the settlers that in Nov. 1641, a petition signed by 18 of them was addressed to the authorities of Massachusetts praying that Gorton and his company might be "brought to satisfaction." Providence, however, being beyond the limits of Massachusetts Bay, the latter colony refused to interfere, until in Sept. 1643, 4 of the principal inhabitants of Pawtuxet, where Gorton had meanwhile settled, submitted themselves to its authority. Gorton was then summoned to Boston, but refused to recognize the jurisdiction thus assumed, and about the same time removed to Shawomet, on the W. side of Narraganset bay, where he purchased land from the sachem Miantonomo. But in June, 1643, two inferior sachems contested his claims to the land, and applied to the general court at Boston for assistance. A body of 40 soldiers was consequently marched to Shawomet, and Gorton and 10 of his disciples were carried

prisoners to Boston, where, the question of the land being soon laid aside, they were put on trial for their lives as "damnable heretics." Gorton and 6 others were found guilty, and most of the magistrates were in favor of putting the leader to death; but they were finally sentenced to confinement and hard labor in irons. In March, 1644, however, they were released, and ordered to leave the colony within 14 days. Gorton then went to England to obtain redress, and having procured a letter of safe conduct from the earl of Warwick to the Massachusetts magistrates, and an order that his people should be allowed peaceable possession of their lands at Shawomet, he returned in 1648 to his colony, which he named after his noble protector. Though Massachusetts did not relinquish her claim over the Shawomet settlement until some years later, Gorton's remaining years seem to have passed quietly. He discharged many important civil offices, and on Sundays used to preach to the colonists and Indians.—Gorton was a man of strict principle, independent, vigorous, and restless spirit, but, like most enthusiasts of his stamp, intolerant, opinionative, and headstrong. He was exceedingly violent in his language, and his contempt for all authority that was not founded on the supreme authority of England brought him constantly into conflict with the colonial magistrates. It is difficult to determine what were his religious opinions. He despised a clergy and all outward forms, and held that by union with Christ believers partook of the perfection of God, that Christ is both human and divine, and that heaven and hell have no existence save in the mind. He differed from other sectaries perhaps more in language than opinion. Gorton published "Simplicite's Defence against seven-headed Policy," a vindication of his course in New England (4to., London, 1646; reprinted in the collections of the Rhode Island historical society); "An In-corrutable Key composed of the OX. Psalme" (4to., London, 1647); "Saltmarsh returned from the Dead" (4to., London, 1655); "An Antidote against the common Plague of the World" (1657); "Certain Copies of Letters," &c. He also left in manuscript a commentary on a part of the Gospel of St. Matthew.—See his life by J. M. Mackie in "Sparks's American Biography."

GORTYNA, an ancient city of the island of Crete, inferior only to Onosus in importance and splendor. It was situated on a plain watered by the river Lethæus, at a distance of 90 stadia from the Libyan sea, where were its two harbors, Lebena and Metallum, and it was once, according to Strabo, 50 stadia in circumference.

GORUCKPOOR, a British district of Hindoostan, under the lieut. gov. of the N. W. provinces, bounded N. by Nepaul, W. and S. W. by Oude, between lat. 26° 7' and 27° 30' N., long. 82° 12' and 84° 30' E.; area, 7,846 sq. m.; pop. in 1858, 8,087,874, of whom 2,716,775 were Hindoos. The surface is generally level, but broken in the E. and S. E. parts by ridges of low steep hills. The principal rivers are the

Goggra, Gunduck, and Raptée, which have a S. E. course. The district also abounds in dhils, or shallow lakes, the largest of which, 12 m. W. from the town of Goruckpoor, is 7 m. long by 8 m. broad in the dry season. The soil is rendered fertile by careful irrigation. Cotton is cultivated to some extent. The inhabitants are very poor, and agriculture is almost the only branch of industry. The district was ceded to the British in 1801 by the vizier of Oude, in commutation of subsidy.—GORUCKPOOR, the principal town of the above district, is situated on the left bank of the Raptée, here crossed by a ferry 600 feet long, 104 m. N. N. E. from Benares and 480 m. N. W. from Calcutta; pop. 54,529. It is surrounded by forests and plantations, and during the rainy season is often encompassed by water.

GOSHAWK, a bird of prey of the family *falconida*, sub-family *accipitrina*, and genus *astur* (Lacép.). The bill is short, broad at the base, with the culmen elevated and arched; the tip acute, with the lateral margins festooned in the middle; the nostrils large and in the basal cere; wings reaching to the middle of the tail, the 3d, 4th, and 5th quills nearly equal and longest; the tail long and broad; tarsi rather longer than middle toe, covered with broad transverse scales in front and behind; toes long, strong, and well padded below; claws strong, long, and curved. Gray describes 18 species, which are found throughout the world, generally in wooded and sometimes in mountainous districts. The form is rather long and slender, the wings comparatively short, and the legs and tail long; they fly very swiftly and strongly, and always strike their prey while on the wing; they lurk about poultry yards, seize a duck or a chicken, and are out of shot before the farmer is aware of his loss; they also prey upon wild ducks, grouse, pigeons, hares, rabbits, squirrels, and other animals of this size; they build their nests on lofty trees, and lay from 2 to 4 eggs. The only species in the United States is the American goshawk (*A. atricapillus*, Wils.), found all over North America, but most abundant in the north and north-west. The adult female is about 2 feet long, with an extent of wings of 4 feet, and a weight of about 3 lbs.; the male is smaller; both sexes are alike in plumage. In the adult the general color of the upper parts is dark ash-gray, the shafts and sometimes the edges of the feathers black; head above and neck behind black with a grayish tinge; a broad line of white over each eye; under parts grayish white, sides and abdomen tinged with brown; blackish brown longitudinal streaks on the fore neck, and transverse blackish gray lines on the breast, sides, and belly; quills brown, ashy on their inner webs; tail with 4 or 5 broad brownish black bands, and narrowly tipped with white. The young birds differ much from the adults, and are dark brown above, with light markings; the tail ashy; the under parts white, with yellowish red tinges, each feather with a longitudinal stripe ending in a brown ovate

spot. This is one of the boldest and most rapid of the genus, and follows with untiring wing the flocks of wild pigeons and ducks; it seldom alights unless to devour its prey, and when thus engaged stands very erect. The nest is of large size, flat, and made of coarse materials; the eggs are of a bluish white color, sometimes with light brownish spots.—The European goshawk resembles the American, but the transverse bands on the under surface are much more regular. It equals the gerfalcon in size, but not in strength and courage; though an ignoble bird, and falling obliquely on its prey, it is used in falconry for the weaker and ground game, such as hares and rabbits, or birds of low flight like grouse and ducks.

GOSHEN, a post town, semi-capital of Orange co., N. Y., situated on the Erie railroad, 70 m. N. W. of New York, and 105 m. S. W. of Albany; pop. in 1855, 3,218. It is celebrated for excellent butter, of which 129,918 lbs. were made in 1855, chiefly for the New York city market. In addition to the county offices, the town in 1855 contained 4 churches, an academy, a seminary for young ladies, 2 newspaper offices, a fulling mill, 3 grist mills, 4 saw mills, 2 tanneries, and 2 banks. Incorporated in 1809.

GOSHEN, in biblical geography, the district of Egypt in which Jacob and his family settled, and where his descendants remained till their deliverance by Moses. The locality is generally fixed in lower Egypt, E. of the Pelusiac branch of the Nile, around Heroopolis. An attempt to fix it accurately according to evidence supplied by the heaps of ruins called by the Arabs *Tel el Jhud* (Mounds of the Jews), a few hours' journey to the N. E. of Cairo, is regarded by Robinson as not sufficiently warranted.

GOSLAR, an ancient town of Hanover, 26 m. S. E. of Hildesheim, on the Gose, at the base of the Rammelsberg; pop. 7,800. Its most important public edifices are the town house, which was erected in the 15th century, the imperial palace, now in part a ruin, and the Gothic church, whose library contains a considerable number of Luther's MSS.

GOSNOLD, BARTHOLOMEW, an English voyager to America, died in Virginia, Aug. 22, 1607. He was one of those who joined Raleigh in his attempt to colonize Virginia, and after the failure of that enterprise was placed in command of an expedition fitted out at the cost of the earl of Southampton and others for planting a settlement in New England. He sailed from Falmouth, March 26, 1602, with one small vessel and a company of 82 persons, 20 of whom were colonists. Instead of following the usual route by the Canaries and West Indies, he steered directly across the Atlantic, and in 7 weeks reached Massachusetts bay, first seeing land probably not far N. of Nahant. Thence he turned S., and landed on Cape Cod, to which he gave the name it still bears. Sailing around the promontory, and stopping at the island now known as No Man's Land, but which he called

Martha's Vineyard, Gosnold anchored at the mouth of Buzzard's bay, and resolved to plant his colony on an island which he christened Elizabeth, and which now bears the Indian name of Outtyhunk. The adventurers here built and fortified a house, but the hostility of the Indians, scarcity of provisions, and disputes about a division of the profits, disheartened them, and the whole party returned to England, accomplishing the voyage in 5 weeks, and taking a valuable cargo of sassafras root, then highly esteemed as a medicine, cedar, furs, and other commodities. The result of the expedition was such as to encourage many others to follow the same short route across the ocean, and pursue the explorations which Gosnold had begun. Gosnold next turned his eyes toward Virginia, and after long efforts succeeded in organizing a company for colonization in that region, the heads of which were Edward Wingfield, a west of England merchant, Robert Hunt, a clergyman, and the famous Capt. John Smith. A charter was granted them by James I., April 10, 1606, which was the first instrument of that nature under which the English were planted in America; and on Dec. 19, 1606, Gosnold set sail with 3 small vessels and an ill-assorted band of 105 adventurers, only 12 of whom were laborers, and very few mechanics. After a tedious voyage, a storm having driven them into Chesapeake bay (April 26, 1607), they sailed up James river, which they named after the king, disembarked about 50 m. above its mouth, and founded the settlement of Jamestown. Sickness and various disasters destroyed 50 of their number before autumn, among whom was the projector of the colony.

GOSPEL (Sax. *godspell*, corresponding to the Gr. *euangelion*, a joyful message), either the whole system of the doctrines of Christ, or one of the 4 histories of his life and teachings written by Matthew, Mark, Luke, and John. The extant spurious gospels, forming a part of the apocrypha of the New Testament, are the "History of Joseph the Carpenter," the "Gospel of the Infancy," the "Gospel of Thomas the Israelite," the "Protevangelion" of James, the "Gospel of the Nativity of Mary," and the "Gospel of Nicodemus, or Acts of Pilate." Many others, not extant, are mentioned by the church fathers.

GOSSE, PHILIP HENRY, an English zoologist, born in Worcester, April 6, 1810. He went to Newfoundland in 1827 in a mercantile capacity, and during a residence there of 8 years occupied his leisure by collecting insects and making colored drawings of them. He removed to Lower Canada, where he pursued his studies of zoology, particularly entomology, for 3 years, and afterward travelled in the United States, making in Alabama numerous drawings of the *lepidoptera* of that region. After his return to England in 1839, he published the results of his observations under the title of the "Canadian Naturalist" (London, 1840). In 1844 he visited Jamaica to study the zoology of that island, and on returning after 18 months published his

"Birds of Jamaica," and "Naturalist's Sojourn in Jamaica," and a series of articles on insects in the "Annals and Magazine of Natural History." In 1849 he published his "Introduction to Zoology," and was also engaged in writing works on natural history for the society for the promotion of Christian knowledge. He published in 1853 his "Rambles of a Naturalist on the Devonshire Coast," in which he related his experience of keeping marine animals in vessels filled with sea water; and by this work and another entitled the "Aquarium" (1854), he was influential in creating a general interest in aquaria. He has accumulated many drawings and observations of the *rotifera*, some of which he has communicated to the microscopical society, and published in 1856 the first part of a "Manual of Marine Zoology for the British Isles." In 1859 he published "Letters from Alabama (U. S.)," chiefly relating to natural history.

GOSZOZYNSKI, SAWERYN, a Polish poet, born in the Ukraine in 1806. He studied at Warsaw, became a member of certain secret revolutionary societies during the rule of the grand duke Constantine in Poland, and on the evening of Nov. 29, 1830, joined the small band of youths who by their attack on the grand duke's palace gave the signal for the revolution of 1830-'31. After the fall of Warsaw (Sept. 1831) he left Poland, and has since lived alternately in France and Switzerland. After having shared for some time, like Mickiewicz, in the mystico-religious movement of Towianski, he resumed his literary occupations in 1848. The most celebrated of his earlier poems is *Zamek Kaniowski* (the "Castle of Kaniow"). Collections of his works appeared at Lemberg in 1828, and at Breslau in 1852.

GOTHA, formerly an independent duchy (Saxe-Gotha), but now politically united with Coburg under the name of Saxe-Coburg-Gotha; pop. of Gotha in 1855, 106,411, and of its capital of the same name about 15,000. The latter is alternately with Coburg the residence of the duke, and is the principal station of the Thuringian railway, by which the distance to Halle is 83 m. and to Weimar 30 m. The palace of Friedenstein adjoins the town, and contains collections of fine arts and one of the richest collections of coins in Europe; also a library with 180,000 vols. and 5,000 MSS., among which are 14 folio vols. of St. Bernard's correspondence and 500 Arabic MSS. Gotha possesses 7 Protestant churches, and since 1856 one for Roman Catholics; a famous gymnasium and many excellent educational and charitable institutions; also since 1855 a society for the benefit of poor musicians. It is one of the most prosperous trading and manufacturing places of Thuringia. It is the seat of a celebrated fire and life insurance company, and of the geographical establishment of Justus Perthes, the publisher of the "Gotha Almanac." The moderately liberal members of the Frankfurt parliament, whose ideal was the English constitution and of whom Heinrich von Gagern

was the leader, held a convention at Gotha in 1849, whence they were called the Gotha party.

GOTHAM, a parish of Nottinghamshire, England, the Boeotian rusticity of whose inhabitants gained them the proverbial appellation of "the wise men of Gotham."

GOTHENBURG, or GOTTENBURG (Swed. *Göteborg*), a län or province of Sweden, in the S. W. part of the kingdom, bordering on the Cattegat, the Skager Rack, and Norway; area, 1,890 sq. m.; pop. in 1855, 195,792. It forms a narrow strip of land between the mountains which separate it on the E. from the provinces of Elfsborg and Wernersborg, and the rugged coast, which is indented by numerous bays and bordered by many small islands. The climate is severe; the soil is sterile, and there are few manufactures except in the capital city.—GOTHENBURG, the capital of the above province, and the second commercial city of Sweden, is situated at the head of a fiord on the Cattegat at the mouth of the Götha river; pop. in 1855, 82,618. It has a good harbor, with 17 feet of water, enclosed by 2 long ridges of rock about 1½ m. apart. There is anchorage for vessels of large size, but only the smaller craft can come up to the shore. The city is intersected by navigable canals, and as it occupies marshy ground, the houses of the lower town are generally built on piles. The upper town stands on adjacent rocky heights. The houses are mostly of stone or stuccoed brick, with terraced roofs, and are often surrounded by fine gardens. The principal public edifices are the cathedral, the Swedish church, the new exchange, the arsenal, the town hall, the theatre, and the East India house, but the city has few attractions for strangers. It contains a college, a library, 2 orphan asylums, a society of arts, free schools, and public baths. The manufactures comprise cottons, woollens, sail cloth, tobacco, snuff, glass, paper, leather, refined sugar, and porter. Most of the merchants are Scotch and English. The principal exports in 1858 were: iron, 83,170 tons; planks and boards, 340,000 dozen; grain, 109,470 barrels. The imports were: cotton, 8,000,000 lbs.; cotton twist, 172,618; wool, 298,783; coffee, 2,815,859; rice, 207,475; sugar, 11,951,876; tobacco, 1,408,860; spirits (also given in pounds), 762,698; wine in casks, 1,040,862; in bottles, 9,000 gals.; salt, 82,289 barrels; coal, 491,025 barrels. The shipping of the port at the same period comprised 143 vessels, of 40,200 tons. The entries during the year were 1,473 vessels of 185,300 tons, and the clearances were 1,337 vessels of 191,084 tons. The city was founded by Gustavus Adolphus in 1611, and was once well fortified, but most of its defences have been demolished. It has suffered frequently from conflagration.

GOTHIC LANGUAGE AND LITERATURE. The Goths (properly written *Gauts*, also called *Getae*) of Moesia were the first among the Teutons who received a regular system of writing. Their language, akin to the idioms of the Gepidae, Rugi, Heruli, Burgundi, and Van-

dals, is claimed by the Scandinavians as their own (see DENMARK, LANGUAGE OF), and with equal right by the Germans (see GERMANY, LANGUAGE OF). The Ostrogothic and Visigothic were probably dialects, spoken in Italy, southern France, and Spain, where they modified the Romanic tongues (see FRANCE, LANGUAGE OF), leaving some words in the modern idioms, as well as in the mediæval Latin. Traces of it were also found among the Tetraxite Goths near the isthmus of Perekop (Crimea) in the 16th century. It was enriched with Lithuanian, Slavic, Latin, and Greek words; it is of pure and strong intonation, capable of originating new compounds, and rich in idioms. Before Ulfilas, the Goths already had *Rúnir* (mysteries, engraved lines), which, together with the Greek and Latin letters, were the prototypes of the alphabet attributed to him. This consists of 24 letters, according to Fr. Junius, Hickes, Lye, &c., in the *Codex Argenteus*, but of 26 according to Gesenius and others; they were also used as numeral signs, with two additional signs, one for 90, the other for 900. In the *Steirerins* (illustration; Icelandic *skír*, to elucidate, polish; see below) there are also some ligatures, and in other manuscripts some other signs. One letter, the þ, represents our aspirated th, and the letter imitated from Greek υ represents both this and the Latin υ. The sounds of the Latin ē and ð are written with *ai*, *au*; *ei* stands for *i*, and *gg* is pronounced *ng* as in Greek; *ð*, *ð* are very rarely used. (For the interchanges of the letters, when compared with other languages, see the articles on the separate letters, especially D and G, and on the German language.) The so-called Gothic letters of printers are not Gothic, but uncouth, angular distortions of the Latin ones, like those of the MS. Virgil in the Vatican library, of the 8d century A. D., and many others.—In the remarks that follow we shall take the German and Latin as the bases of comparison. The Gothic article is as follows: *sa*, der; *so*, die; *thata*, das; gen. *this*, des; *thisos*, der; dat. *thamma*, dem; *thisai*, der; accus. *thana*, den; *tho*, die; *thata*, das; pl. masc. *thai*, fem. *thos*, neuter *tho*, die; gen. *thisa*, der; dat. *thaim*, den; accus. *thana*, *thos*, *tho*, die. There are 4 cases, nominative, genitive, dative, and accusative; the ablative is only the dative with prepositions. The declensions are as follows: *a*. Strong: *fiska* (Lat. *piscis*, Germ. *Fisch*, fish), *fiskis*, *fiska*, *fisk*; pl. *fiskos*, *fiska*, *fiskam*, *fiskans*. *b*. Weak: *hairt-o* (Lat. *cor*, *cord-is*, Germ. *Herz*, heart), *-ina*, *-in*, *-o*; pl. *hairt-ona*, *-ane*, *-am*, *-ona*. Examples of promiscuous cases: *galaubein-ais* (Germ. *Glau-ben-s*); *ahm-an* (Lat. *anim-um*, Germ. *Athem*); *hand-au* (dat. *Hand*), *-uns* (*Hände*), *-um* (*Händ-en*); *manag-eim* (dat. pl. *Mengen*); *eastjōs* (Lat. accus. pl. *vestes*); *sun-us* (son), *-aus* (Germ. *Sohn-es*), *-au* (*Sohn-e*), pl. *-jus* (*Söhn-es*), &c.—Adjective: *gamain-s* (Germ. *gemein-er*, Lat. *commun-is*), fem. and neuter, *-a*; comparative degree: masc. *-sa*, fem. *-sei*, neuter *-so*; superlative: *-sta*, *-st*. Irregular: *gōða* (good), *batiao* (better), *batists* (best); *ubila*, *vairrisa* (evil, worse); *mikela*,

*maiso*, *maisists* (Lat. *magnus*, *major*, *maximus*); *leistr*, *minneis*, *minnists* (*parvus* [little], *minor*, *minimus*). The numerals are: 1, *ains*, *aina*, *ain*; 2, *twai*, *toos*, *tva*; 3, *thrins*; 4, *fidoor*, *fidur*; 5, *fimf*; 6, *saihs*; 7, *sibun*; 8, *ahtau*; 9, *ainn*; 10, *laihun*, *-tig*; 12, *toalib*, *toalif*; 20, *twain-tig*; 30, *thrinistiguns*, &c.; 80, *ahlautehund*; 100, *hund*; 200, *toahunda*, &c.; 1,000, *thunend*.—Some of the pronouns are: *Ik*, *thu*, *is* (fem. *ei*, neuter *ita*; Lat. *is*, *ea*, *id*); *meina*, *theina*, *ises* (*mei*, *tui*, *ejus*); *mis*, *thus*, *imma* (*mih*, *tibi*, *ei*); *mik*, *thuk*, *ina* (Germ. *mich*, *dich*, *ihm*); dual, *vit*, *git* (we two, ye two); gen. *ugks*, *igvis* (of us two, &c.), &c.; *isains*, *silba*, *unsar*, *hveleiks*, *hvas*, &c. (Germ. *jener*, *selber*, *uner*, *welcher*, *was*). Examples of verbs: *visan* (Germ. *Wesen*, Lat. *esse*); *im*, *is*, *ist*, *sittum*, *sittik*, *sind* (*sum*, *es*, *est*; *sumus*, *estis*, *sunt*); *vaa*, *vast*, *vas*, *vesum*, *vesuth*, *vesun* (*fui*, *fuisti*, &c., Eng. *was*); future: *sitau*, *sittis*, *sittai*, &c.; *vairthan* (Germ. *werden*), *sōkian* (Lat. *sequi*, Germ. *suchen*), &c. The following verb is compared with Sanscrit and Latin: *bair-a* (Sansk. *bhārā-mi*, Lat. *fer-o*), *-i* (*-ei*, *-e*), *-ith* (*-ti*, *-t*); dual, *bair-arus* (Sansk. *-ias*), *-ats* (*bhārā-ias*); it has no 8d person (Sansk. *bhārā-tam*); pl. *bair-am* (Sansk. *bhārā-vas*, Lat. *fer-i-mus*), *-ith* (*bhārā-tha*, *-tis*), *-und* (*-oti*, *-unt*); passive or middle: *bair-ada* (Sansk. *bhāri*, Lat. *fer-or*), *-aza* (*-asā*, *-oris*), *-ada* (*-atā*, *-tur*), &c. The following are some of the adverbs, prepositions, and conjunctions: *ais*, ever; *thar*, there; *her*, here; *iup*, upward; *uta*, outward; *af*, of; *at*, to; *fram*, from, of, for; *since*; *gou*, if; *inthammai*, whereas, Germ. *indem* (in-that), &c. *Abra*, strong, vehement; *aglo*, affliction; *balsagga*, neck, *aneia*, a mercenary, and many others, are peculiar words.—We subjoin a few specimens of phrases:

*Mikileia saivala meina fan.*  
Magnify soul mine (my) (the) Lord (Slav. *pos*).

*Managai quithana in gainamma*  
Many quoth-shall (say) (to) me on you (Germ. *jenen*)

*daga, fan.* *Atta unsar thu in himinam;*  
day, (O) Lord! Father our (unsar) thou in heaven (Him-  
mel);

*veihnai namō thein; quimai*  
holly-be (geweithet) name thine; come

*thiudinassus theins; vairthai eijs*  
kingdom (*Dienst*) thine; be done (words) will

*theins; . . . . hlaiþ unsarana thana*  
thine; . . . . loaf (Slav. *lěd*, bread) our the

*einteinan gif uns himnadaga; jah aſet uns*  
perpetual (daily) give us this-day; and aſet us

*thatei skulana, &c.*  
that gullt (Germ. *Schuld*), &c.

The following lines exhibit a comparison of Gothic with Anglo-Saxon and English; the two first differ somewhat in their order:

*Jah andhaffande ea hundaftritha goth:*  
*Tha andswarode eo hundredes-ealdor, and*  
*And (then) answering the centurion, and*

*thus ooth: Dryhten! ne eom to cyrthe ei uſ*  
Lord! not am I worthy that under

*hrot inſange mein inſaggote, at thaladad*  
cottage (thatchet) mine in-guest, ac ooth but only

<i>goth</i> this	<i>vaurda</i> as word,	<i>jah</i> as	<i>gahaldmīth</i> mēn
goth (my)	one word	and	healed (Germ. <i>geheilt</i> )

*sa thimurgus meina*  
*chapra bih gehaled.*  
(will be) the servant (Germ. *Knahe, Knecht*) mine.

—LITERATURE. Ulfilas (Ulfila, Wulphilas, Germ. Wölfel, little wolf; but *Ouphilas* in the ecclesiastical history of Philostorgius, his fellow countryman and almost contemporary), born in Cappadocia about 318, whence he was taken, together with his family, by the Goths, into Moesia, became their second bishop about 348, and is considered as the translator of almost the whole Bible into Gothic (between 360 and 379). The *Codex Argenteus* (rather *Aureus et Argenteus*), containing a portion of the Gospels, translated by Ulfilas, with capitals of gold foil and the other letters of silver foil, deeply impressed into very fine vellum of a violet color, was made for the use of a Gothic king. It was a part of the plunder taken either by Clovis (507) from Toulouse, after the defeat of Alaric II., or by Childbert from King Amalaric (531). Anton Morillon, secretary to Cardinal Granvelle, found it in the monastery of Werden, near Cologne. Thence it was sent to Prague, and thence to Stockholm by Count Königsmark, after the storming of that city. Voessius, on visiting Queen Christina, became its possessor (1655), and carried it to Holland, where it was purchased by Pufendorf (1662) for Count M. G. de la Gardie, chancellor of Sweden, who presented it to the university of Upsal (1669), having enclosed it in a silver case. It contained originally 640 pages, only 326 of which were legible in 1670, and a dozen leaves were purloined even of this remnant. Erik Benzel produced a splendid edition of it, and it was subsequently republished by Fr. Junius (Dort, 1665), Georg Stiernhielm, from an exact transcript of the original by Derrer, which was burned at Upsal in 1702 (Stockholm, 1671), and Edward Lye, from Benzel's edition (Oxford, 1750). Johan Ihre, assisted by Sothberg, published a treatise on it, *Ulphilas Illustratus* (Upsal, 1752-'5), and *Fragmenta Versionis Ulphilanae* (1763), which were reprinted by Dr. A. F. Baschong under the title *Scripta Versionem Ulphilanam et Linguam Mæso-Gothicam illustrantia* (Berlin, 1773). The version of the Bible was probably continued by others after Ulfilas, and the contents of the silver codex itself were revised in Latin versions. Fr. Ant. Knittel found at Wolfenbützel (1756) a palimpsest with Gothic fragments of the epistle of Paul to the Romans (*Codex Carolinus*). Angelo Mai and Carlo Castiglione discovered at Milan 5 palimpsests, containing parts of Matthew, the epistles of Paul almost complete, some fragments of Ezra and Nehemiah, of a Gothic calendar, and of a homily. Castiglione edited the fragments of the epistles of St. Paul (1839-'39). The epistles to the Hebrews and the Corinthians, the Apocalypse, and the Acts of the Apostles are wanting; but it is not known whether they were ever translated into Gothic. Gothic signatures of names on documents were found at Naples (in the inscrip-

tions of Donis), of which fac-similes were published by Sierakowsky and Massmann (fol., Vienna, 1838). But the *Gothicon* of Constantine Porphyrogenitus (lays sung at court by circus riders dressed in the garb of Goths, accompanied by the *pandura*, a sort of lyre), and the inscription on a yard-stick, are not genuine Gothic.—See J. W. Pfaff, *Sprache des Ulfilas* (Nuremberg, 1817); G. Waiz, *Ueber das Leben und die Lehre des Ulfilas* (Hanover, 1840); Kirchhoff, *Das Gothische Runen-Alphabet* (Berlin, 1851); Zacher, *Das Alphabet des Ulfilas und das Runen-Alphabet* (Leipzig, 1855); Weingärtner, *Die Aussprache des Gothischen zur Zeit des Ulfilas* (Leipzig, 1858). Grammars of the Gothic language may be found in Lye's *Dictionarium Gothico-Latinum* (2 vols. fol., London, 1772), and Zahn's *Ulfilas* (Weissenburg, 1805); and glossaries in Junius's *Ulphilas* (1665) and Diefenbach's Gothic vocabulary. Complete editions of Ulfilas were published by Von der Gabelentz and Löbe (Altenburg, 1836), Schulze (Magdeburg, 1844), and Uppström (Upsal, 1854); and compendiums by Gaugengigl, H. F. Massmann (Stuttgart, 1855-'6), and Stamm (Paderborn, 1858). Massmann also published the *Skeireins* (explanation) of the Gospel according to St. John (Munich, 1834), and Löbe the *Erklärung zur Skeireins* (Altenburg, 1839).

GOTHS (Lat. *Gothones, Guttones, Getae*, &c.), an ancient nation who took an important part in the overthrow of the Roman empire. Their origin can scarcely be said to be ascertained. An opinion formerly prevailed that Sweden was their native region; but the more critical research of modern times appears to have decided that their birthplace was the mountain chain of Caucasus. If we can attain to any legitimate acquaintance with the Goths previous to their inroads upon the south, it must be from ancient Scandinavian chronicles. This source of information is far more trustworthy than the accounts of the Romans, who could speak of them with authority only after their migration. The Goths, it is assumed, issued from Scandinavia. They had made their way thither at a time unknown to history, and were followed by another and later army of Asiatics, Scythians (70 B. C.), Suiones, or Swedes. Geijer thinks it probable that the arrival of the Swedes occasioned the emigration of the Goths, and supposes this movement to have been about the commencement of the Christian era. In the primitive times of which we speak, the land was unable to support the increase of people, and the governments therefore took every means to encourage emigration. Three ships are said to have borne away from Sweden the first of the Goths. Reaching the southern shores, where they were annually reinforced from the north, it was not until they had united and allied themselves with the inhabitants of the southern Baltic coasts, that they grew up into that mighty people who overran the Roman empire. Montesquieu supposed that Roman tyranny had forced the people of the south to retire to the north, and hence that

prodigious population which came to be re-gorged upon Rome. This opinion is disproved by some later philosophers on account of the Goths retaining no southern characteristics. Cassiodorus, the principal minister of Theodoric the Great, wrote a history of the Goths, which agrees with the Scandinavian chronicles of their migrations and wanderings from regions beyond the Baltic. Procopius speaks of Goths, Vandals, and Gepidæ, as one people in all respects; and describes them as of fair complexion, with reddish yellow hair, and tall manly forms. "They were governed," he adds, "by the same laws and customs; they were formerly of the same heathen religion, and are now universally Christians of the Arian sect. Their language is that called Gothic, and they hold themselves to be one nation, descended from one stock." The Goths first appeared in the 3d century, establishing a colony on the banks of the Palus Mæotis or sea of Azof. Under the reign of Valens (A. D. 364-378) they took possession of Dacia (Transylvania and the adjoining regions), and came to be known as Ostrogoths and Visigoths, or East and West Goths; the former inhabiting countries on the Black sea up to the Danube, and the latter on this river generally. A kinsman of the emperor of the West attempted to wrest the throne of the East from Valens, and entered into an alliance with the Goths. Valens defeated and drove the Goths beyond the Danube. Meanwhile the empire of the West began to be inundated by the Huns, a Tartar race, previously unheard of in Europe, but who had long before been a scourge of the Chinese. The Goths regarded the Huns with abhorrence. They were attacked by them, and sued for permission from Valens to inhabit territory south of the Danube, in Thrace. Coming into the provinces of Mœsia (Bulgaria and Servia) in legions, they took possession of the country, defeated Valens in battle near Adrianople, where he was killed, and ravaged Achaia and Pannonia. Theodosius ascended both the eastern and western thrones, and Christianity was established throughout the empire (A. D. 379-395). Several Gothic tribes had already embraced the Christian faith, and as early as the year 360 Ulphilas, bishop of the tribes who dwelt in Mœsia and Thrace, had translated the New Testament into the Gothic language. Upon the death of Theodosius, the barbarian nations took advantage of the dissensions of his successors to overrun the empire. The Huns poured in from one direction, while an army of Goths under Alaric invaded the region between the Adriatic and Constantinople, and subsequently marched into Italy and captured and sacked Rome. (See ALARIC.) The Goths gradually intermingled in blood and family connection with the inhabitants of Italy, who during some years after the death of Alaric had native rulers. The Huns under Attila, 500,000 barbarians of many tribes, now threatened Italy and entered Gaul (A. D. 451). They were encountered by Romans, Vandals, and Goths, combined under

command of Aëtius, and suffered a terrible defeat. Theodoric, king of the Visigoths, was among the slain on the side of the Romans. Attila, returning with a fresh army, was only induced to spare Rome by the promise of immense tribute. Meanwhile Spain and southern France came under Gothic dominion; and Odoacer, a prince of the Heruli, penetrating into Italy, dethroned Augustulus, the last of the West-Roman emperors, and assumed the style of king of Italy (A. D. 476). Zeno was emperor of the East, and, becoming embroiled with the Ostrogoths under Theodoric, consented to an invasion of Italy by this prince. Theodoric accordingly crossed the Alps, defeated Odoacer in 3 great battles, and compelled from him, at Ravenna, the surrender of all Italy. Odoacer was put to death; but so great is the estimation in which Theodoric is held by historians, that the death of Odoacer by his hand, for some unknown cause, is assumed to have been justifiable. Italy had begun to prosper under Odoacer, and the impulse was increased by the new king, who reigned 33 years. In 526 Justinian at Constantinople despatched Belisarius to Italy to profit by the Gothic disorders consequent upon the death of Theodoric. He took Rome, and gaining the admiration of the Goths, was invited to be their king. This he refused, but held the Goths in subjection for his master. Totila, a noble Goth, rebelled, and mastered southern Italy. He was about to destroy Rome, but listened to the remonstrance of Belisarius that it would add more to his honor to spare it. He contented himself with dispersing the inhabitants (A. D. 546), and re-peopling it before the arrival of a fresh army from Constantinople under Narses. Totila fell in battle. His successor Theias suffered the same fate. Italy was reconquered (A. D. 554), and the Gothic monarchy founded by Theodoric the Great was extinguished. In Spain and southern France the Visigoths maintained a splendid monarchy until the year 711, when Roderic was killed in battle against the Moors, who, crossing from Africa, subjugated the kingdom.—The Goths, originally savage and barbarous, became a cultivated and enlightened people before the period of Theodoric. Grotius gives them high commendation for morality, integrity, love of justice, and good faith. There never had been a better administration in Italy than that of Theodoric. He was worthily styled *Romanæ decus, columenque gentis*. His religion was Arianism, and hence the Roman fathers have not all been admirers of Theodoric. The Catholics, however, were not only unmolested by him, but themselves generally acknowledged that at no other period did their church enjoy greater prosperity. All the Gothic princes and tribes were tolerant of the faith of others. They were also distinguished in some degree as friends of the fine arts, science, and learning. Theodoric maintained overseers of works of art, whose offices were to guard the statues, and watch over the preservation of public buildings. These were kept in repair, and others were

erected. The old Gothic style of architecture was thus originated; a simple massive character of art, which must not be confounded with modern Gothic, which dates even later than the Lombards in Italy. The laws of the Visigoths were digested into a regular code, 50 years before the pandects of Justinian, who possibly borrowed the idea of a code from the Visigothic princes. Theodoric and the Goths in Italy preserved the Roman laws. Their form of government was absolute monarchy of a mixed elective and hereditary nature; and it has been said of most of the Gothic rulers in Italy, that they made good the promise of Theodoric, who on ascending the throne said that he would strive so to rule that the "only regret of the people should be that the Goths had not come at an earlier period."

GÖTTINGEN, a beautifully situated town of the kingdom of Hanover, 68 m. by rail from its capital, and 36 m. from Cassel; pop. about 11,000. It is best known from its university (*Georg-Augusta*), founded by King George II. in 1734, and inaugurated Sept. 17, 1737. The king's minister Von Münchhausen was its earliest and principal benefactor, and it was chiefly due to his exertions and to those of J. M. Gesner, Heyne, Kästner, J. T. Mayer, Lichtenberg, Schläzer, Spittler, Gatterer, Pütter, Michaelis, Eichhorn (father and son), and to other eminent men, that Göttingen became toward the end of the 18th century the most brilliant university in Europe, by its multiplicity of lectures in all departments of learning, and especially by its superior means of instruction in philosophical branches. The fortunes of the university were not materially changed until the foundation of that of Berlin (1810), which proved a formidable rival. The students, however, still numbered 3,000 in 1825, but the political disturbances of 1831, attended by the armed interference of the government and the imprisonment of the principal insurrectionists, caused a sensible diminution in the attendance, which in 1834 was reduced to about 900. Yet the university could still boast of Blumenbach, Dahlmann, Ewald, Gauss, Gervinus, the brothers Grimm, Heeren, Mitscherlich, Siebold, Stromeyer, K. O. Müller, &c. The magnificent new university building was inaugurated on the day of its 100th anniversary in 1837, but the hope of reviving the former glories of Göttingen was doomed to disappointment in the course of the same year by the expulsion of 7 of the professors (Albrecht, Dahlmann, Ewald, Gervinus, the two Grimms, and Wilhelm Weber), who had protested against King Ernest's abrogation of the Hanoverian constitution. The death of K. O. Müller in 1840 was another calamity which deprived the university of the services and the prestige of one of its most distinguished ornaments. Two of the expelled professors (Ewald and Weber) resumed their functions in 1843, but Göttingen has not yet fully recovered from the shock which its prosperity had received, although it

is still attended by about 700 students, and employs the services of about 100 professors and teachers. The university library comprises 300,000 vols. and 5,000 MSS. It surpasses almost all other German libraries in its copious collections of modern works, and is regarded as one of the best arranged libraries in Europe. The academy of sciences comprises sections for mathematics, natural sciences, and history. The *Gelohrte Anzeigen*, the oldest learned periodical in Germany, is published under its auspices. Academic offences are tried in the council house behind the library. The aula in which degrees are conferred is not as large as, but in arrangement much like the senate house of the English university of Cambridge. On its upper floor are the *Kerker* or places of confinement for delinquent students. The museum of natural history contains a collection bequeathed to it by Blumenbach, including human skulls of natives of all quarters of the globe; it possesses also a large collection of coins, some few works of art, and some dresses brought from the South sea by Capt. Cook. Connected with the university are seminaries for theology, philology, and since 1850 also for mathematics and natural sciences; hospitals, clinics, and an anatomical theatre; a botanical and economical garden; a school for veterinary surgeons; a chemical laboratory; a fine physiological institution founded in 1852; an observatory under the direction of Gauss until his death in 1855; and since 1851 an agricultural school. Göttingen possesses also a gymnasium, 7 parochial schools, 2 female seminaries, and other educational institutions. The most prominent of them is the industrial school of Wagemann, which is a model of its kind. There are 5 Lutheran churches, including the university church, a Reformed and a Roman Catholic church, and a synagogue. The charitable institutions are numerous. The manufactures consist of cloth, woollen stuff, surgical instruments, soap, leather, turnery, gold and silver wares, &c. The most prosperous tradespeople of Göttingen are the booksellers and tobaccoists.

GOTTLAND, or GOTHLAND, an island in the Baltic, belonging to Sweden, between lat. 56° 55' and 57° 57' N., about 80 m. long and 33 m. broad; area, about 1,126 sq. m.; mean height above the level of the sea about 180 feet; pop. in 1855, 46,985. Its geological structure is of floetz rocks. The climate is temperate, the mulberry and grape ripening in the open air. There are many small streams and lakes, and extensive groves of oak and pine. Sandstone is exported to Stockholm; and there are quarries of chalk, marble, and limestone. The people are chiefly employed in rearing cattle and fishing off the coast. The island possesses 2 or 3 good harbors. During the war of 1854-'5 the French and English fleets resorted much to good anchorage ground among the islets upon the N. coast. The chief towns are Wisby and Sliteo, the latter designed to be protected by forts which are not yet finished (1858). A submarine



telegraph, connecting the island with the mainland of Sweden, was laid in May, 1859.

GOTTSCHALK, LOUIS MOREAU, an American pianist and composer, born in New Orleans in 1829. He was sent in 1841 to Paris, and, after 4 years' instruction in music, made his first public appearance as a pianist in April, 1845. For several succeeding years he made professional tours on the continent of Europe, and in January, 1853, returned to the United States. His first concert took place in New York in the succeeding February, since which time he has appeared periodically there and in various other American cities. As a composer he has produced the *Bamboula*, *Bannanier*, *Banjo*, and other pianoforte pieces suggested by his recollections of southern life, and also the *Apothéose*, *Marche de nuit*, *Chant de soldat*, &c.

GOTTSCHELL, RUDOLF, a German poet, born in Breslau, Sept. 30, 1823, has written *Lieder der Gegenwart* (2d ed., 1842); *Censurflüchtlinge* (2d ed., 1843); several dramas, as "Robespierre," "Lord Byron," &c.; and a historical poem entitled *Sebastopol* (1856).

GOTTSCHED, JOHANN CHRISTOPH, a German author, born in Judithenkirch, near Königsberg, Feb. 2, 1700, died in Leipsic, Sept. 12, 1766. He was educated at Königsberg, studied theology, but abandoned it for philosophy and belles-lettres, and was for 32 years professor of logic and metaphysics at Leipsic. He became president of the literary society of Leipsic in 1726, held for a time a sort of literary dictatorship in Germany, and made purity of language and clearness and elegance of style more esteemed than all other literary merits. Bodmer and Breitinger of Zürich opposed him, accused him of stifling genius by rules, and recommended Shakespeare and Milton for models instead of Racine and Boileau. Gottsched was an indefatigable author, and left tragedies, translations, philosophical treatises, and various controversial and critical works. His chief merit was in laboring to make the German language the sole medium of instruction, by publishing popular manuals and abridgments of scientific and philosophical works in the vernacular tongue.

GOUDA, a town of Holland, 11 m. N. E. of Rotterdam, on both banks of the Gouw at its junction with the Neder Yssel; pop. 14,823. It is entered by 5 gates, and has canals through the centre of all its streets. The principal manufactures are tobacco pipes (in which 3,000 persons are employed), cotton weaving, parchment, leather, and white lead.

GOUDCHAUX, MICHEL, a French statesman, born of Jewish parents in Nancy in 1801, took an important part in political affairs at the time of the revolution of 1848, when he was twice minister of finance, and for some time a member of the constituent assembly. In 1857 he was chosen a member of the *corps législatif*, but he declined to swear allegiance to Napoleon III.

GOUGES, MARIE OLYMPE. See AUBREY.

GOUGH, JOHN B., an American lecturer on temperance, born in Sandgate, Kent, Eng-

land, Aug. 22, 1817. His father was a soldier, who after taking part in several battles in the peninsular war, settled down on an annual pension of £20; and his mother was for 30 years the village schoolmistress. At 12 years of age he came to America as apprentice to an emigrant tradesman, with whom he settled on a farm in Oneida co., N. Y. He removed to New York city in 1831, and obtained employment in the Methodist book room, applying himself to bookbinding. His mother and sister joined him in 1833, but the former died within a year after her arrival. He soon made convivial acquaintances, fell into habits of dissipation, and was frequently thrown out of employment. At length, having sunk into extreme poverty and degradation, it was his custom to repair night after night to the lowest grog-shops, and sing comic songs and play the buffoon to the *habitues*, who supplied him with drink in return. He married in 1839, and undertook bookbinding on his own account, but his intemperance prevented his success. He had suffered from delirium tremens, had lost his wife and child, and was reduced to the utmost misery, when a Quaker invited him in the street to take the temperance pledge. He soon related his history at a temperance meeting, with such effect that he was at once esteemed a leading orator in the temperance cause, and his services were much in request. In 1842 he was induced by some of his former companions to violate his pledge, and made his confession of the fact at a public meeting in Worcester. Since 1843 he has labored incessantly in behalf of temperance, and with such ability and success that his movements have sometimes resembled a triumphal march. After lecturing to crowded audiences in the principal cities of the United States, he went in 1853 to England at the invitation of the London temperance league, lectured in Exeter hall and other large buildings in London, and spoke in the principal towns in England and Scotland, everywhere creating a remarkable impression. He has since his return lectured less frequently in the United States. His autobiography and a volume of his orations have been published.

GOUGH, HUGH, viscount, a British general, born at Woodstown, co. of Limerick, Ireland, in 1779. He entered the army in 1794, and after serving against the Dutch at the Cape of Good Hope and in the West Indies, in 1809 joined the British forces in Spain, distinguishing himself at Talavera, Barrosa, Vittoria, Nivelle, &c. During the war in China he was commander-in-chief of the land forces, and for his services was made a baronet. Having been transferred to India with the supreme command, in Dec. 1843 he gained the battle of Maharajpore against the Mahrattas of Gwalior. Upon the breaking out of the first Sikh war in 1845, with the coöperation of Sir Henry Hardinge, the governor-general, he defeated the enemy at Moodkee, Dec. 18, and again at Ferozeshah on the 22d. He finished the campaign, Feb. 10, 1846, by taking the intrenched camp of the Sikhs at

Sobraon, though with terrible loss to his own troops. For these victories he was raised to the peerage as Baron Gough. His services in the Sikh outbreak of 1848-'9 were more creditable to his bravery than to his generalship. Negligence and mismanagement characterized the march of the British forces under his command into the Punjab, and a disastrous and unprofitable combat took place at Marnuggar on the right bank of the Chenab, which might have proved a decisive victory had Lord Gough taken the precaution to transport his whole army across the river. At Chillianwallah, on Jan. 18, 1849, another useless battle was fought, which came near proving a total defeat to the British forces. On the afternoon of that day he came in sight of the Sikh army, under Shere Singh, posted in a very advantageous place and protected by dense masses of jungle. Against the advice of his officers and without an adequate knowledge of the ground, he attacked the enemy, and in such confusion that no distinct order of battle seems to have been given. Shere Singh, having drawn the British forces into a general action, opened several masked batteries upon them with murderous effect; and after one of the severest struggles on record, in which the rashness of the British commander had more than once turned the scale against his own troops, they remained masters of the field, though with the loss of 100 officers and nearly 2,500 men. On Feb. 21 Lord Gough attacked the Sikhs at Guzerat, and this time completely routed them. News of the dearly bought victory of Chillianwallah had meanwhile reached England, and Lord Gough was at once superseded in the command of the Indian army by Sir Charles Napier. The veteran, however, was raised to the additional rank of viscount in acknowledgment of his undoubted bravery and long service, was thanked by parliament, and a pension of £2,000 was settled upon himself and his two next successors.

GOUGH, RICHARD, an English antiquary, born in London, Oct. 21, 1735, died Feb. 20, 1809. He was a fellow of the royal society, and for many years director of the society of antiquaries, of which he wrote a history, and to whose *Archæologia* he was a frequent contributor. Among his works are enumerated a new edition of Camden's *Britannia*, the valuable additions to which were the fruit of many excursions through England, Scotland, and Wales; "Anecdotes of British Topography" (4to., 1768; enlarged, 2 vols. 4to., 1780); and the 5 magnificent folios of the "Sepulchral Monuments of Great Britain" (1786-'96).

GOUJET, CLAUDE PIERRE, a French historian and miscellaneous writer, born in Paris, Oct. 19, 1697, died there, Feb. 1, 1767. He was educated at a college of Jesuits, entered the order of Oratorians, and proved a zealous Jansenist. His immense labors as a historian, a compiler, and a critic, injured his health during his later years; he lost his sight, and being entirely bereft of fortune, was obliged to sell his valu-

able library. Of his many works the following are some of the most important: *Bibliothèque des auteurs ecclésiastiques* (8 vols. 8vo., 1736), being a sequel to Dupin's collection; *Dissertations sur l'état des sciences en France depuis la mort de Charlemagne jusqu'à celle du roi Robert* (12mo., 1737), which won a prize from the academy of inscriptions; *Histoire du pontificat de Paul V.*, from documents furnished to him by M. de Brèves, who had been French ambassador at Rome; *Bibliothèque Française, ou histoire littéraire de la France* (18 vols. 12mo., 1740 et seq.), his most valuable work; *Mémoire historique et littéraire sur le collège royal de France* (4to., 1758). He edited Richelet's *Dictionnaire*, and Moreri's *Dictionnaire historique*. He left moreover in manuscript his *Mémoires historiques et littéraires*, which were published immediately after his death.

GOULD, AUGUSTUS ADDISON, M.D., an American naturalist and physician, born in New Ipswich, N. H. April 23, 1805. His father's family name was Duren, which was changed to that of Gould. He was graduated at Harvard college in 1825, took his medical degree in 1830, and at once commenced practice in Boston, where he has since resided. During his college life he devoted his spare moments to the study of natural history; in the early part of his professional career he lectured frequently on scientific subjects, and for 2 years gave instruction in botany and zoology at Harvard college. In 1855 he delivered the annual discourse before the Massachusetts medical society, the title of his address being "Search out the Secrets of Nature;" and in 1856 he received the appointment of a visiting physician to the Massachusetts general hospital. He is a member of the principal American, and of several foreign learned societies. He is an accomplished naturalist, and in the department of conchology stands preëminent both at home and abroad. His principal published works are: a translation of De Lamarck's "Genera of Shells" (12mo., Boston, 1833); "System of Natural History" (8vo., 1838); translation of Gall's works; the "Invertebrate Animals of Massachusetts" (8vo., Cambridge, 1841), published by legislative authority; "Principles of Zoology," with Prof. Agassiz (12mo., Boston, 1848); "Mollusca and Shells of the U. S. Exploring Expedition under Capt. Wilkes" (1 vol. 4to., 1852, with an atlas of plates); the completion of Dr. A. Binney's "Land Mollusks of the United States" (3 vols. 4to., 1851-'5); the "Mollusca of the North Pacific Expedition under Capts. Ringgold and Rogers" (in preparation, 1859); and numerous articles in medical magazines, the Boston "Journal of Natural History," the "American Journal of Science," the "Christian Review," and the newspapers of the day.

GOULD, HANNAH FLAGG, an American poetess, born in Lancaster, Mass., near the close of the last century. Early in life she removed to Newburyport, Mass., where she has since resided. A volume of her poems was collected

and published in 1832; a 2d volume in 1836; a 3d in 1841. These volumes were much read and admired, both in America and England. Since that time she has been a constant contributor to the periodical literature of the day, and has written some of her best pieces. In 1846 she published "Gathered Leaves," a collection of prose articles. "The Diosma" appeared in 1850, composed of selections from her previously published poems, and from other authors, with some of her own not before published. "The Youth's Coronet" was issued in 1851, and "Hymns and Poems for Children" in 1854. Her poetry is characterized by great purity of thought, and religious sentiment. Many of her pieces relate to familiar objects, which she invests with new interest, and to which she imparts a high moral association. Some of her most exquisite poems have been written for children, to whom they have become as "household words."

GOULD, JAMES, an American jurist, born in Branford, Conn., about 1770, died in Litchfield, May 11, 1838. He was graduated at Yale college in 1791, and became justice of the supreme court of Connecticut. For many years he conducted the law school at Litchfield, first in conjunction with Judge Tappan Reeve, and subsequently alone. He published a "Treatise on the Principles of Pleading in Civil Actions," of which several editions have appeared.

GOULD, JOHN, an English naturalist, born in Lyme, Dorsetshire, Sept. 14, 1804. Between the ages of 14 and 20 he resided at the royal gardens of Windsor, passing many hours of each day in studying the habits of birds and collecting specimens. His reputation as a taxidermist procured him an engagement to prepare specimens for the museum of the London zoological society, and in 1831 '2 he appeared before the public as the author of an imperial folio volume entitled "A Century of Birds from the Himalayan Mountains," descriptive of a collection of birds then recently received in England, and of which the colored illustrations were from the pen of his wife. He next undertook a work of a much more extensive character entitled the "Birds of Europe." It was published in 22 parts between 1832 and 1837, with illustrations by Mrs. Gould, and had an extensive sale. In 1838 he went in company with his wife to Australia, where during a residence of 2 years he collected the materials for his "Birds of Australia," which, with illustrations from the designs of Mrs. Gould, who died before the completion of the work, was published in 1842-'48 in 7 folio volumes, at the price of £115. It contains descriptions and drawings of 600 species, double the number previously known. In 1845 he commenced the "Mammals of Australia," of which 7 parts had appeared in Sept., 1859. His next most considerable work was his "Monograph of the Trochilidae, or Family of Humming Birds" (imp. fol., 1850), suggested by his unrivalled collection of humming birds, of which, after many years' perseverance and at considerable expense, he had procured 2,000 specimens

illustrating 320 species. Among Mr. Gould's remaining works are: "Monograph of the Ramphastidae" (imp. fol., 1833-'5); "Icones Avium" (parts 1 and 2, imp. fol., 1837-'8); "Monograph of the Trogonidae" (imp. fol., 1835-'8); "Monograph of the Macropodidae, or Family of Kangaroos" (imp. fol., parts 1 and 2, 1841-'2); and "Monograph of the Odontophorinae, or Partridges of America" (imp. fol., 1844-'50).

GOUR, GAUR, or LUCKNOUTI, a ruined city in the district of Maldah, Bengal presidency, British India, 25 m. S. E. of Rajmahal and 179 m. from Calcutta. Its remains are spread over a range of low hills which extend along the E. bank of the Bhagruttee, and cover a space 7 m. long (15 m. including suburban villages) by 2 or 3 m. broad. Many of the buildings have been demolished for the sake of the bricks of which they were constructed, but several grand edifices are still standing. Of these the most remarkable are a mosque, built of brick, and lined with a kind of black porphyry, a curious building faced with bricks of various colors, an obelisk 100 feet high, numerous reservoirs, now swarming with alligators, insects, and vermin, and 2 lofty gates of the citadel. Several villages have grown up on part of the site, and the rest is mainly covered with forests or is under cultivation.—The earliest record of Gour dates from the year 648, when it was governed by powerful independent chieftains. In 1202 it was taken by an officer of the viceroy of Delhi under Shahal-ud-deen, monarch of Ghore in Afghanistan, and in 1212 it became the capital of Bengal, an eminence which it retained, except during an interval of about 50 years previous to 1409, until the British gained possession of the district in the 18th century. Its decline, however, began about 1574, when Monaim Khan, commander of Akbar's troops, captured it and made it the seat of an independent power, but in a few months fell a victim, with nearly all his troops, to the deadly climate. No cause has since contributed so much to its decay as the diversion of the Ganges from its former to its present channel, 4 or 5 m. distant, in the 17th century.

GOURD (*ouurbita*, Linn.), the name of a number of kinds of different sized fruits, which belong to rapidly growing plants, and some of which have such hard rinds or shells that they can be employed for utensils. The bottle gourd (*C. lagenaria*, Persoon) is a well known example. In shape it resembles a bottle with a long straight neck, its rind becomes on drying hard like wood, and the shell, when a portion of the side is cut away and the pulp and seeds extracted, serves the purposes of a ladle or dipper. There is a variety with a very long fruit, looking so much like a club that it receives the name of club gourd. The orange gourd (*C. aurantia*, Willd.) has beautiful, globular, small-sized fruits, of the shape, color, and appearance of oranges. Another, with parti-colored pear-shaped fruit, is the pear gourd; and there is still another whose fruit resembles an egg.

These several kinds are reared in gardens, being trained upon trellises and around poles as articles of ornament or of curiosity. Several kinds of gourds, too, are cultivated as esculents, their fruits being called summer squashes. These have likewise hard rinds and a dry spongy pulp when they are fully ripened and dry, and therefore are only fit for food when half-grown and succulent and mucilaginous. They form a particular group in the gourd family, and are unlike others, which can be laid aside for winter use. Among them are the scalloped summer squash (called cymling at the south), and the long-necked warty squash, supposed to be respectively *C. melopepo* and *verrucosa* (Linn.), but according to some researches instituted by the late Thaddeus William Harris of Harvard college, these names are erroneously applied. From their inability to extend their branches laterally, or to run over the ground, some are called bush squashes. In England the succade is raised exclusively for the table, a sort supposed to have originated from the *C. ovifera* (Linn.). According to Dalechamps (1586), the *C. verrucosa* was some sort of a winter squash; and in the small warted pumpkin of Nantucket Dr. Harris was inclined to suspect that he had found the true species. From this peculiar variety, so universally raised on that island, and supposed to have come from the Indians, may have originated our present field pumpkins, frequently planted among the hills of Indian corn, and considered a part of the crop. It is to this section of the gourds called pumpkins that the immensely growing fruit of the Valparaiso (said to have been introduced by Commodore Porter of the U. S. navy) belongs; and from some hybridization with it originated the marrow or autumnal marrow squash, which is really a pumpkin, and can be kept for winter use. Somewhat similar is the Hubbard squash, also remarkable for its keeping properties. The seeds of these differ from those of the true gourds and from the seeds of the summer squashes, being plumper, longer, wider, and with a thicker margin. The true winter squash is represented in the bell-shaped species, the base being very broad and the neck very short. From this have come the crook-neck and the Canada crook-neck; the latter is a small sub-variety induced by climate, and when planted where the heat is longer continued, it grows to greater magnitude. Champlain found the bell-shaped winter squash among the northern Indians in 1605. Much difference, not only in the shape of the seeds, but in that of the leaves and in the structure of the fruits, is perceptible between these different groups of *cucurbita* or gourds. The native country of many of the most useful of them is considered to be unknown, although some botanists assign the East Indies as their home. It is more probable that they were indigenous to the tropics of America. The cultivation of the squash and pumpkin is exceedingly simple, ample nutriment from stimulating manures and considerable heat being the chief

requisites. The only caution to be observed is to avoid a promiscuous planting of several kinds, as oftentimes the best and most esteemed soon become worthless by hybridizing with the coarser and inferior sorts. This is usually effected by bees and insects, and distance or seclusion of the particular fruit to be saved for seed sowing is the only preventive.

GOURGAUD, GASPARD, baron, a French general, born in Versailles, Sept. 14, 1783, died July 26, 1852. He studied at the polytechnic school, and at that of Châlons, entered the army in 1802, and fought in the campaigns of Germany (1805-'6), of Poland (1807), of Spain (1808), and again in Germany (1809). Sent to Dantzic in 1811 to examine the strength of its fortifications, his reports gained the favor of Napoleon, and Gourgaud accompanied the emperor to Dresden, and on his march to Russia in 1812. He was wounded at Smolensk; at Moscow he prevented an explosion of 5,000 cwt. of gunpowder stored in the Kremlin, and was rewarded with the title of baron. On the retreat he proved his bravery at the passage of the Beresina. He fought in the battles of Saxony, where, after the battle of Leipzig, he saved the corps of Marshal Oudinot by delaying the command of Napoleon to destroy the bridge of Freyberg. After the battle of Brienne in the campaign of 1814, he saved Napoleon at Mézières from a troop of Cossacks, one of whom was already aiming his lance at the emperor. After the fall of Napoleon he was well treated by the Bourbons, on whose flight he joined the emperor (1815). Made general after the battle of Fleurus, he was among the last on the battle field of Waterloo, followed Napoleon to Malmaison and Rochefort, and carried his letter to the prince regent of England. Chosen one of the three who were allowed to follow the emperor in his exile, he lived 3 years at St. Helena, but left the island in consequence of illness and misunderstandings, went to England, and addressed the congress of Aix la Chapelle and Maria Louisa in favor of the captive emperor. Having published an offensive account of the battle of Waterloo, he was arrested and sent to Ouxhaven. In 1821 he was allowed to return to France, where a legacy from Napoleon enabled him to live independently, though deprived of his titles. Together with Gen. Montholon he published the *Mémoires de Napoléon à Sts. Hélène* (8 vols., London, 1828). His *Examen critique* (1825) of Segur's "History of the Grand Army" caused a duel between the two generals, and was followed by a sharp controversy with Sir Walter Scott, who accused him of having compromised his master at St. Helena. Under Louis Philippe he was again in active service, was made commander of the artillery at Paris, lieutenant-general, and peer of France. In 1840 he accompanied the duke de Joinville on his journey to St. Helena, to bring the remains of Napoleon to Paris. After the revolution of Feb. 1848, he was colonel of the first legion of the national guard of Paris, and member

of the legislative assembly, where he sided with the conservatives.

GOUT, a painful disease affecting principally the fibrous tissues about the smaller joints, and intimately connected with an excess of uric acid and its compounds in the blood. Various names have been given according to the part affected, as podagra when in the feet, chiragra when in the hands, sciatica when in the thigh, &c.; but all such, and probably many cases of neuralgia accompanied by oxalic deposits in the urine, are mere forms of one disease. A common attack of acute gout is generally preceded by uneasiness, indigestion, loss of appetite, nausea and vomiting, biliary derangement, dull pains or numbness in the parts to be affected, often with feverish symptoms; but in some cases, on the contrary, the disease comes on in the midst of apparent health and well-being, and occasionally at night during refreshing sleep. In most cases it makes itself known by an acute pain in the metatarso-phalangeal joint of the great toe; different sufferers compare this to the sensations produced by the contact of a drop of cold water, or of cold or heated metal, or by twisting, dislocation, or laceration, as by a nail or wedge driven into the foot; this is accompanied by feverish symptoms, urinary sediment, extreme tenderness, restlessness, involuntary muscular contractions, sleeplessness, and perspiration; the affected joint is swollen, red, and hot. This series of symptoms may last 4 or 5 days, to be followed after a day or two by 3 or 4 others, continuing in all from 2 to 3 weeks; the severity of the attack, its persistence, its seat, and its metastases vary according to circumstances. This first warning past, the luxurious epicure may not receive another, even if he persist in his indulgences, for months or perhaps years; but the second comes, and the third, and so on, the intervals between the attacks becoming less; though the pain be less severe, the joints are more discolored and swollen, with cedema and chalky deposits in their neighborhood; and by a sudden retrocession toward the internal vital organs, life may be seriously threatened. When gout becomes chronic the attacks are more irregular, less severe, more frequent and sudden, leaving one joint for another after slight exposure to cold and moisture, excess at table, or vivid emotions; in this form, the continuance of the pain, and the fear of injuring the gouty joints, render its subjects cross, fretful, and disagreeable, though persons thus affected are often able to devote themselves to serious study and important private and public business; gouty fingers have signed state documents of great moment, and deformed and almost ankylosed toes have borne their owners painfully and slowly to conferences where a people's happiness was at stake. The pathology of gout reduces itself chiefly to the abnormal presence of uric acid in the blood, and to the deposit of urate of soda in the fibrous tissue around the joints and sheaths of tendons. Gout is rare before the age of 20, and men of robust constitution and of a mixed sanguine

and bilious temperament are far more liable to it than females; it may be inherited, and seems independent of climate except so far as it influences the diet of a people, the northern races from necessity being generally less temperate in the use of stimulating food and drinks than southern nations. A life of indolent sensuality, amid the excitements and passions of civilization in cities, and the use of highly seasoned animal food with alcoholic stimulants, are the predisposing causes to this disease, the only consolation of which in the minds of its victims is that it belongs almost exclusively (at least in its worst manifestations) to the wealthy, the aristocratic, the fashionable, and the luxurious. A person may have a gouty diathesis, and die from the evils arising from it, without having experienced what is popularly understood as a "fit of the gout;" the gout poison (uric acid) may be eliminated from the blood in any organ rich in fibrous tissue, and from recent researches it would seem that many cases of neuralgia (*sciatica* and *hemicrania*), lithiasis, and oxaluria, with oxalate of lime deposits in the urine, are symptoms of the same morbid action, an excess of uric acid in the blood either from over production or accumulation; the habits and manner of life, the tissues most affected, and the peculiar urinary deposit, indicate the identity of the above forms of disease, and the propriety of the same treatment in all. Organic chemistry teaches that in the gouty diathesis, with excess of urates and oxalates, there is a deficiency of oxygen in the system; hence the uric acid may remain unchanged, or may be oxidized only into oxalic acid, the latter remaining as such instead of undergoing further oxidation and being converted into carbonic acid and urea, in which forms it can be removed from the organism. As the urate of soda is the principal cause of the pain in gouty joints, so oxalate of lime may be the immediate producer of the pains of sciatica. This view of the correlation of gout and neuralgia is fully treated by Dr. Easton, in the "Glasgow Medical Journal" for Oct. 1858. We find gout attacking the upper ranks of society, who indulge in a highly nitrogenous diet, which tends to produce uric acid in excess, even though the normal quantity should be duly eliminated, and the disease assumes the form of urate of soda deposits in the joints; in the lower classes, consuming less animal and stimulating food, and taking in more oxygen from their daily exercise, the uric acid becomes the oxalic, and the gouty diathesis manifests itself in neuralgia with oxalate of lime in abundance in the urine. By many authors rheumatism is considered closely allied to gout; and accordingly cases of the latter disease affecting especially fibrous tissues are sometimes called rheumatic gout, a pathological hybrid as absurd and impossible as scarlatinic measles would be, as Dr. Garrod has clearly shown; a gouty person may have also rheumatism, but the two diseases are distinct and cannot pass the one into the other, the former having as a promi-

nent character an excess of uric, and the latter of lactic acid.—There are few diseases which have had more empirical remedies extolled for their cure than gout; almost every drastic purgative, diuretic, tonic, and narcotic, has been pressed into the service, either for external or internal use. To say nothing here of soothing topical applications, colchicum has enjoyed, and deservedly, a great reputation in the treatment of gout and neuralgia, between the attacks and in their chronic forms; it is most efficacious when it acts upon the skin and bowels. The acetate of potash and other alkalies are in favor with many both for their diuretic property and as alkalinizing the acid in the blood and urine. Nitro-muriatic acid has been found of advantage for supplying the oxygen necessary for the conversion of the uric into oxalic acid, and the latter into carbonic acid and urea. The judicious use of purgatives, abstinence from highly nitrogenous food and stimulating drinks, attention to hygienic rules as regards pure air, exercise, regular habits of labor and sleep, and avoiding exposure to dampness, cold, and fatigue of body or mind, are absolutely necessary as aids in the treatment of this disease, whatever may be the peculiar theory of the physician as to its nature and special seat.

GOUVION SAINT CYR, LAURENT, a French marshal, born in Toul, April 18, 1764, died in Hyères, March 10, 1830. He studied the fine arts, but after Aug. 10, 1782, enlisted among the volunteers who rushed to the invaded frontier. Being elected captain by his companions, he was attached to the staff of Gen. Oustine, and in the course of one year rose to the rank of general of division. In 1796 he commanded one of the divisions of the army on the Rhine under Moreau. In 1798 he was sent to Rome to reestablish discipline in the army, which had nearly revolted against Masséna, and succeeded in this; but the commissaries of the convention procured his recall. After the 18th Brumaire he served under Moreau, and defeated Kray at Biberach. In 1801 he was sent as ambassador to Spain, and in 1802 commanded the French army of observation in southern Italy. He had proved too independent in his conduct and sentiments to please Napoleon, who assigned him to employment which gave him no opportunity of gaining distinction. In 1808 he was sent to Catalonia, and relieved Barcelona in spite of the scanty resources placed at his disposal; but being dissatisfied with the treatment he received at the hands of the emperor, he sent in his resignation and left his post without waiting for his successor. This being considered a breach of discipline, he was cashiered and ordered to his country seat, where he remained for 3 years in a kind of imprisonment. In 1811 he was called back to service, commanded a corps in the great army which invaded Russia, and defeated Prince Wittgenstein at Polotzk on the Duna, Aug. 7, 1812; for this victory he was made a marshal. During 1818 he made a heroic stand at Dresden, signing at last an hon-

orable capitulation. This, however, was not sanctioned by Prince Schwartzberg, and he and his troops were sent prisoners to Austria. He consequently took no part in the events which marked the fall of the empire. He gave in his adhesion to the Bourbons, and on the 2d restoration became minister of war under Talleyrand, and again, Sept. 12, 1817. He retired in 1821, and devoted his leisure hours to the preparation of his *Mémoires*; the last volumes were published after his death in 1831.

GOVONA, ROSA, a philanthropic Italian woman, founder of the establishment *delle Rosine* at Turin, born in Mondovì in 1716, died in Turin, Feb. 28, 1776. She was left an orphan without fortune at an early age, and supported herself from childhood by her own labor. Having accidentally met and saved from suicide a friendless and suffering girl, the incident suggested to her a plan for uniting many destitute young girls into a society so that they could obtain the means of subsistence by their labor. She carried her purpose into effect first at Mondovì, and in 1756 in Turin, and with so much success that she received the approbation and aid of the government, the king himself providing her with a large building, and giving the establishment the name of the Rosines. Similar establishments were soon founded under her direction in other Italian cities, Novara, Fossano, Savigliano, and Obiesi, which are still flourishing, all of them being dependent upon the central one at Turin. A monument with an appropriate inscription marks the tomb of Rosa Govona in the chapel of the Rosines.

GOWER, JOHN, an English poet, born, according to popular tradition, in Yorkshire, though other authorities make him a native of Kent or of Wales, about 1325, died in 1408. He was a gentleman of considerable estate, and appears to have studied law and to have contracted a friendship with Chaucer. It has been said, but on insufficient proof, that he attained the dignity of chief justice of the court of common pleas. Like Chaucer, he was a Lancastrian, and like him also a censurer of the vices of the clergy. According to Tyrwhitt the intimacy between the friends was interrupted shortly before their death, but this is not certain. Chaucer dedicates his "Troilus and Criseida" to Gower, calling him "moral Gower," and the latter in his *Confessio Amantis* introduces Venus calling Chaucer "my disciple and my poet." Gower's chief works are the *Speculum Meditantis*, a treatise on the duties of married life, in French verse, in 10 books; the *Vox Clamantis*, a poem in 7 books, describing in Latin elegiacs the insurrection of the commons under Richard II.; and the *Confessio Amantis*, an English poem, said to have been written at the suggestion of Richard II., consisting of 8 books and a prologue, in octosyllabic verse, interspersed with Latin elegiacs and prose tables of contents, and comprising an illustrative collection of moral and metaphysical reflections, with stories, spun out to tedi-

ous length. Of these works the 1st is supposed to have perished, the 2d exists in manuscript copies, and the 3d, which was finished in 1393, was first published by Caxton in 1493. A new edition, with a life of the author and a glossary, by Dr. Reinhold Pauli, appeared in London in 1857 (3 vols. 8vo.). Some smaller poems of no great merit are preserved in MS. in the library of Trinity college, Cambridge; and Warton discovered in the library of the marquis of Stafford a volume of *balades* in French, which was printed in 1818 by Lord Gower for the Roxburgh club. Gower is known chiefly by his *Confessio Amantis*, which was undoubtedly suggested by Chaucer's English poems. Hallam says: "He is always sensible, polished, perspicuous, and not prosaic in the worst sense of the word." In the latter part of his life he was afflicted with blindness.

GOYANNA, a town of Brazil, in the province of Pernambuco, on the river Goyanna, 35 m. N. W. of Olindo, and 12 m. from the sea: pop. 6,000.

GOYAZ, a central province of Brazil, between lat. 6° and 20° S.; area, 813,000 sq. m.; pop. in 1853, 120,000; in 1856, according to government returns, which, however, are not to be trusted, 180,000. The surface is mountainous, and intersected by numerous rivers. The soil, except near the rivers, is not remarkable for fertility. The chief productions are cotton, timber, and cattle.—GOYAZ, the capital of the above province, is situated on the Vermelho, 680 m. N. W. of Rio de Janeiro; pop. 7,000.

GOZLAN, LÉON, a French dramatist and *littérateur*, born in Marseilles in 1806. His most popular productions are: *La goutte de lait* (1848), *Le gâteau des reines* (1855-'6), *Il faut que jeunesse se passe* (his best comedy), and *Un petit bout d'oreille* (1857). Among his tales and novels are: *Le médecin du Pœcy* (new ed. 1858), *La famille Lambert* (new ed. 1858, dramatized in 1857), *Les maîtresses de Paris*, &c.

GRAAL, or GRAIL, THE HOLY (in old French *san gréal*, in old English *sancgreall*, either from Fr. *saint*, holy, and the Celtic *greal*, Provençal *grasal*, and med. Lat. *gradalis*, a vase or cup, or from the French *sang réal*, the "real blood" of Christ), one of the leading themes of mediæval romance, fabled to have been the cup from which at our Saviour's last supper he drank the wine, and gave to his disciples to drink, saying: "This is my blood." The cup was preserved by Joseph of Arimathea, who received into it also the blood that flowed from the side of Jesus on the cross, and afterward preserved it with pious care as a precious relic. Such is the account given in the apocryphal Gospel of Nicodemus, from which time both ecclesiastical and profane writers are silent concerning it for many centuries. In the 12th century it reappears, clothed with marvellous attributes, the central subject of the prophecies of Merlin, and the object of the adventurous quest of all the knights of the round table. The legend assumed manifold forms in a great diversity of romances. Ac-

ording to one of the earliest traditions, it was made of a single precious stone, possessed miraculous life-giving powers, had originally been brought from heaven by angels, and was preserved by a society of chosen knights in a temple on the unapproachable mountain, Mont-salvage. It seems to have been associated with the contests between the Moors and Christians in Spain, and with the foundation of the order of templars. In the Arthurian romances Joseph of Arimathea is confounded with a missionary and bishop named Joseph, mentioned in the chronicles as having been sent in the 4th century by St. Augustine from Africa to Britain, and said to have crossed the seas from Judæa, guided only by the flaps of his garments which he trailed as a rudder. On his arrival in Britain he consecrated his son first bishop of the country, and made his other relatives Christian kings, the successors of the exterminated or converted pagan kings. It is related that after the death of Christ he had been imprisoned by the Jews for 50 years, but had been kept by the holy graal in perpetual youth. He was released by the personal aid of the Saviour, who taught him the words of the mass, and bade him renew every day the sacrament of the last supper. The holy graal was the last cup from which he had drunk, and contained the last drops of blood that he had shed on the cross, and its possessor alone had power to confer on other chalices made in its likeness its own mysterious power to effect the transubstantiation. Thus the holy graal lay at the foundation of the exercise of the Christian priesthood. Among the privileges which the holy graal conferred on its possessor was that of perpetual youth. It was however required of him that he should be a perfect man, and a virgin. In some forms of the legend the vessel remained in the care of Joseph of Arimathea; more frequently he is said to have died after several centuries, and after bestowing his authority and the holy graal on his son; the latter also preferred the joys of heaven to an eternal life on earth, and in like manner consecrated one of his relatives in his place. The last was a contemporary of King Arthur, and, unmindful of his charge, sinned, and the sacred vessel fled from him, and was lost. To find and recover it was the task which the knights of the round table imposed on themselves. The quest was long and adventurous, because the vessel changed its place, and always escaped even from the sight of every one who did not possess perfect purity. At length, according to Sir Thomas Malory's compilation, Sir Lancelot reached "the doore of the chamber wherein the holy sancgreall was." He was warned to depart when the door opened, but nevertheless he dared to look in, "and saw a table of silver, and the holy vessel covered with red samite, and many angels about it, whereof one of them held a candle of wax burning, and the other held a crosse and the ornaments of the altar." He ventured to enter, but when he came nigh the table of silver "he felt a breath, that him thought was

intermeddled with fire, which smote him so sore in the visage that him thought it all to-brent his visage, and therewith he fell to the ground, and had no power to rise." He lay "twenty-four dayes and as many nights as a dead man," and recovered only to return to King Arthur's court, and to abandon further quest. It was reserved to Sir Galahad, who possessed all the requisite perfection of purity, to achieve the holy graal. He was admitted to view it, but "began to tremble right sore when the deadly flesh began to behold the spiritual things. Then he held up both his hands toward heaven, and said: 'Lord, I thanke thee, for now I see that which hath beene my desire many a day. Now, blessed Lord, would I no longer live, if it might please thee, good Lord.'" His death followed, and immediately after the holy graal was carried up to heaven. "Sithence was there never no man so hardy for to say that hee had seene the sancgreal." In other romances Sir Percival is distinguished in the place of Sir Galahad. At a later period several churches in France and Italy claimed to possess the holy graal, and in 1101, the crusaders obtained a cup which was for a time identified with it, and which is still preserved in the cathedral of Genoa.—The *Queste du Saint Graal* is one of the longest of the 5 great romances of the cycle of King Arthur. The *Percival* and *Titur-el* of Wolfram von Eschenbach treat the same subject. See also Boissier, *Ueber die Beschreibung des Tempels des heiligen Graal* (Munich, 1834).

GRABBE, CHRISTIAN DIETRICH, a German dramatist, born in Detmold, Dec. 14, 1801, died there, Sept. 12, 1836. His best dramas are: *Don Juan und Faust*, *Friedrich Barbarossa*, *Aschenbrödel*, and *Die Hermannschlacht*.

GRACCHUS, TIBERIUS SEMPRONIUS, a Roman statesman, born about 168 B. C., or according to Plutarch 5 years later, died in 133 B. C. His father, Tiberius Gracchus, had been censor, consul, and a successful commander, but was even more renowned for his virtues, says Plutarch, than for his public honors. The mother of the Gracchi, Cornelia, was a daughter of Scipio Africanus. She had 12 children, 9 of whom died young, leaving her two sons and one daughter, Sempronia, who was married to Scipio Africanus the younger. Tiberius, the eldest son, carefully educated by accomplished Greek instructors, and a fine speaker, was renowned even in youth, and fought with distinction under Scipio Africanus at the siege of Carthage, being the first to mount the walls at the storming of that city. As soon as his age allowed he was chosen into the college of augurs. Appius Claudius sought and obtained him as the husband of his daughter. Tiberius went as questor with the consul Mancinus against the Numantines; and when that consul by his misconduct had nearly lost his army, Gracchus negotiated a treaty which saved 20,000 Romans. But the senate refused to be bound by the treaty; they even resolved to send back Mancinus with

all his officers to the enemy. The people interfered, saved the officers, and only the consul was given up. This action on the part of the people, it is said, won them the sympathy of Tiberius. On his way to Spain through Etruria, Gracchus had been struck by the solitude of that once populous region. He saw that the great proprietors had driven out the small farmers; only slaves and cattle filled its fertile territory. He now resolved to revive the Licinian law, and became the friend of the people. His mother, it is said, encouraged him to enter into politics, and complained that she was known as the mother-in-law of Scipio rather than the mother of the Gracchi. Gracchus, having consulted with his father-in-law, with Mucius Scaevola, the famous lawyer, and others, now proposed to revive, with a few modifications, a forgotten law passed 232 years before, the effect of which would be to take away from the rich the excess of the public lands held by them above a certain limit. He would allow to each man only 500 jugera (about 800 acres); and if he had two sons, they might hold 250 jugera each. Some compensation for buildings was to be made to the holders from the public treasury, and 8 commissioners were to be appointed to carry out the law. The surplus taken from the rich was to be divided among the landless. Tiberius was elected tribune 133 B. C., and proposed to the tribes this law, known as the agrarian law. The rich optimates opposed it with violence. Some of the ancient aristocracy sustained Gracchus, but the majority of the senate hated him. They persuaded one of the tribunes, M. Octavius, to oppose his veto to the law. This checked the reformer, but in turn he suspended the functions of every officer in the state, and sealed up the public treasury. The nobles, however, still resisted. The reformer determined to depose Octavius by the votes of the tribes who had elected him. The voting went on until 17 of the 35 tribes had voted for his deposition, when Gracchus once more tried persuasion. Octavius had been his friend. He besought him to yield; he embraced, he kissed him; he reminded him of their former friendship, and offered to repay him for all the land he might be forced to lose. Octavius would have relented, but the optimates prevented him. He was deposed, and Gracchus sent an officer to drag him from the tribunal. The people crowded around the deposed tribune, and in the tumult one of the servants of Octavius was killed. The new law having now been passed, 8 commissioners, Tiberius Gracchus, his father-in-law Appius Claudius, and his young brother Cains, then serving under Scipio in Spain, were appointed. The senate would allow Tiberius only a denarius and a half (about 20 cents) for his daily expenses as commissioner. Both parties were now excited to fierce hostility. A friend of Tiberius happening to die about this time, it was believed that he had been poisoned by the nobles, and Gracchus went about attended by a body guard of his friends. Attalus, king of



Pergamus, died at this moment, leaving his treasures and his kingdom to the Romans. Gracchus at once proposed that the money should be given to stock the farms of the new settlers under his law, and that the kingdom should be managed by the people instead of the senate. These measures aroused anew the corrupt aristocracy. They resolved that Gracchus must die. They accused him of aspiring to be king of Rome; the base Pompeius asserted that he had already received from Pergamus a diadem and royal attire. It was illegal for a tribune to be chosen two years successively, but Gracchus, conscious of danger, became a candidate for the next year, to shelter himself under the sanctity of the tribunate. To gain the support of the people, he proposed, as his future measures, to shorten the term of military service, and to take the judicial power from the senate and give it to the knights. Paterculus says he also intended to extend the Roman franchise to all Italy, but this is probably an error. The election for tribunes came on in June. The nobles had evidently planned his murder. On the day of election Scipio Nasica led a crowd of senators, who drove back the people, and assassinated Gracchus in front of the temple of Jupiter. His body was thrown into the Tiber, and many of his friends were put to death or banished. His ill-fated career lasted but 7 months. His party, however, did not die with him. Scipio Nasica was sent abroad on an embassy by the senate to withdraw him from the rage of the people, and new commissioners were intrusted with the execution of the laws of Gracchus.—CARUS SEMPRONIUS, brother of the preceding, born about 159, died in 121 B. C. He married the daughter of P. Licinius Crassus, who on the death of Tiberius was chosen commissioner in his place. Caius made in early youth several remarkable speeches, which placed him in the front rank of the orators of Rome. He particularly opposed the law of M. Julius Pennus, which required all aliens to leave Rome. He next went as quaestor with the consul L. Aurelius Orestes to Sardinia, where he was distinguished for his valor, equity, and self-control. The senate, however, still feared him as the avenger of his brother, and sought to detain him a third year in Sardinia. But he returned to Rome about the middle of the year 124. The censors summoned him before them for this conduct, but he successfully defended himself. He now resolved to become a candidate for the tribuneship in spite of his mother's prayers, who begged him to live to be the support of her old age. He thought that his brother's spirit had appeared to him in Sardinia, and said: "Caius, why do you delay? You must die like myself in defence of the rights of the people." Caius was more ardent in temperament than Tiberius. He spoke with greater force; his gesticulation was studied, his voice modulated by untiring care. He was the finest speaker of his time, and many critics preferred his terse elo-

quence, full of natural warmth, to the diffuse rhetoric of Cicero. He became a tribune in 123, and first sought to avenge Tiberius. He proposed a law aimed at Popillius, who had persecuted the followers of his brother, "that any magistrate who had put to death or banished a citizen without trial, should be liable to public prosecution." Popillius fled from Rome, and the tribes banished him from Italy. Caius also prepared a measure attacking Octavius, the tribune who had opposed Tiberius and been deposed. But his mother interfered, and he withheld his law. He next proposed and passed what were afterward known as the Sempronian laws. He revived the agrarian law of Tiberius, with the addition of a system of colonization; gave monthly supplies of food to the people at a low price; built extensive granaries, the ruins of which were seen in the middle ages; took the judicial power from the senate, and made 800 of the knights judges; directed that the provinces of the consuls and praetors should be determined before their election; organized the province of Asia, giving the control of it to the people; made new roads in various parts of Italy, erected milestones, and commenced that great system of public improvement which was perfected by the emperors. At the tribunitian elections for the next year, Caius did not offer himself as a candidate, but the tribes elected him, which they did legally, as fewer than 10 candidates offered. Gracchus was now the supreme ruler of Rome. The tribunitian office under his energy grew to unaccustomed influence. He showed great administrative ability, directing the attention of the nation to public improvements, and winning the popular favor by his affability and benevolence. He now proposed or projected a political measure which offended the citizens of Rome; this was the extension of the Roman franchise to all Italy. The senate at once felt their advantage, and persuaded M. Livius Drusus, one of the tribunes, to veto the new law. Then Drusus outbid Gracchus in the popular favor by offering to found at once 12 colonies, of 3,000 persons each, who were to have their allotments free. Gracchus having proposed to colonize a spot near the deserted site of Carthage, the senate sent him thither to oversee the new colony. When he returned he found much of his popularity gone, and although he removed his residence from the Palatine hill to a house near the forum, and offered to enroll 6,000 colonists for the Junonian colony, he could not prevent the election of two of his bitterest enemies to the consulship. In the next tribunitian elections Gracchus was left out. Opimius became consul in 121, and the life of the reformer was in danger. It was proposed to rescind the law authorizing his Carthaginian colony, and when the measure came to be voted upon, in the tumult one of the opposite party was slain by a follower of Gracchus. The senate declared the reformer and his friends public enemies. Both parties armed,

and the next day a conflict took place, in which his followers were defeated. Gracchus with a faithful slave fled to the grove of the Furies, where the slave first held the sword to his master's heart and then fell upon it himself. The head of Gracchus was cut off, and his enemy Opimius paid for it with its weight in gold. In the massacre which followed, 8,000 persons perished, their bodies being thrown into the Tiber, and many of the friends of Gracchus were imprisoned.

**GRACES, THE** (Lat. *Gratia*, Gr. *Xapites*), mythological beings, generally described as daughters of Jupiter, but called by some daughters of Apollo, and by others of Bacchus; their maternity is still more undecided. The Spartans and Athenians recognized only two Charites, but Hesiod enumerates three, whom he names Euphrosyne, Aglaia, and Thalia; and this number and nomenclature generally prevailed. The Graces were the goddesses of social festivity, happiness, and mirth, the inspirers of those virtues and amenities which render human intercourse delightful, and the patronesses of whatever is graceful and beautiful in nature or in art. Great poets, painters, and sculptors were the peculiar objects of their favor. The Graces were commonly represented as the companions of other divinities, especially Apollo, Venus, and Amor; and their attributes are made always to harmonize with those of the deity upon whom they attend. Thus as the companion of Apollo they bear musical instruments, while as those of Venus they carry myrtle, roses, or dice. They are usually represented as virgins in the bloom of life, embracing each other, and sometimes appear clothed, sometimes naked.

**GRACIAS Á DIOS**, or **GRACIAS**, a city of Honduras, capital of the N. W. department of the state, situated on an elevated plain at the foot of a steep escarpment of the mountains of Selaque; pop. about 5,000. It was founded in 1536 by Juan de Chavez, one of the officers of Cortes. The rich mines in its vicinity soon attracted thither a considerable population, and for a time Gracias á Dios was the first city in all Central America. It was made the seat of the audiencia of the confines, ranking with Mexico in political importance, and the seat also of the ecclesiastical establishments of the country. Both, however, were afterward transferred to Guatemala, and thenceforward Gracias subsided into a secondary rank. It still preserves in its churches some traces of its former splendor. Its inhabitants subsist chiefly by agriculture and mining. Formerly all the commerce with Guatemala passed through it from Puerto Caballos, but it now takes a different route through the gulf of Dulce and Isabal. The temperature and climate of Gracias are delightful and salubrious. Immediately in front of the city a stream plunges down the mountain in two leaps, a distance of upward of 1,200 feet, forming a picturesque fall, surpassing the Staubbach of Switzerland in extent and beauty.

**GRACIAS Á DIOS, CAPE**, the extreme N. E. point of Central America, at the mouth of the large river Wanks or Segovia, in lat. 15° N., long. 88° 12' W. It was so named by Columbus, when, in his 4th voyage, after beating for many days against head winds and adverse currents, he finally succeeded in turning the angle of the continent, and taking his course southward. There is a harbor at the cape, bearing the same name, but it cannot be entered by large vessels. There is also a village of Sambo Mosquitos here, under a chief or head man, who it is alleged recognizes the authority of the supposititious "king of the Mosquitos." The cape was a famous resort of the pirates when they infested the sea of the Antilles. It is said that the infusion of negro blood, so perceptible in the so called Mosquito Indians, is due to the circumstance that a Guinea slaver was wrecked here toward the close of the 16th century, from which the slaves escaped and intermixed with the Indians.

**GRÆVIUS, JOHANN GEORG (GROEVE)**, a German scholar and critic, born in Naumburg, Jan. 29, 1622, died in Utrecht, Jan. 11, 1708. He had begun to study law at Leipsic, when, meeting with Gronovius at Deventer, he was made by conversation with that scholar so conscious of his own deficiencies, especially in classical knowledge, that he determined to begin his education over again and to devote himself only to belles-lettres. After remaining 2 years at Deventer, he passed to Amsterdam, where he studied history under Morus and Blondel, and abjured Lutheranism for Calvinism. In 1668 he succeeded Gronovius in the atheneum of Deventer, and in 1661 obtained the chair of eloquence in the academy of Utrecht, to which was attached in 1667 that of politics and history. His lectures were attended by princes and by many of the young nobles of Holland and Germany. Louis XIV. included him in the number of savants to whom he gave pensions, and the universities of Heidelberg, Leyden, and Padua in vain sought to attract him to them by flattering offers. Among his works, all of which bear marks of great care, are editions of Hesiod, Cicero, Catullus, Tibullus, Propertius, Suetonius, and Florus, and *Thesauri* of Roman and Italian antiquities.

**GRÄFE, KARL FERDINAND VON**, a German professor of surgery, born in Warsaw, March 8, 1787, died in Hanover, July 4, 1840. He was graduated as a doctor of medicine in Leipsic in 1807. He founded a hospital at Ballenstedt in 1808, and brought the Alexisbad near Anhalt into use. In 1811 he removed to Berlin as professor of surgery. During the war with Napoleon he superintended the military hospitals and lazarettos, and after the restoration of peace (1815) he became a member of the medical staff of the army, with the rank of colonel. Students from all parts of the world came to attend his lectures, and his fame became so well established abroad that he was made the recipient of the hospitalities of the British sovereign on his visit to England. In Paris Dupuytren invited him

to take his place as a lecturer, and the Prussian government ennobled him. In 1840 he was summoned to Hanover to operate upon the eyes of the present king, who is blind, but he suddenly died after his arrival there. The revival of the rhinoplastic process was due in a great measure to the labors of Gräfe, who propounded his system in his work *Rhinoplastik* (Berlin, 1818).—ALBRECHT VON, son of the preceding, one of the most successful and skilful of living oculists, born in Berlin in May, 1828, was educated at the university of his native city. At first he gave his attention chiefly to mathematics and the natural sciences, and afterward to medicine. He prosecuted his studies in Prague, Vienna, and Paris, and devoting himself particularly to ophthalmology, he founded, on his return to Berlin, a private establishment for the treatment of the eyes. Since 1857 he has officiated as professor of his science at the university of Berlin. He has founded on the cases which have come under his personal observation, said to amount to upward of 100,000, a new method of treatment, the theory of which he has as yet only partially unfolded. His school is probably more resorted to than any other in Europe.

GRÄFENBERG, a small village of Austrian Silesia, in the circle of Freiwaldau, noted as the seat of the first hydropathic establishment, founded by Priessnitz in 1828, and since his death in 1851 under the direction of his son-in-law Ulhazy. Two monuments to Priessnitz have been erected here, one by Hungarians, the other by Frenchmen, and a funeral chapel by his widow.

GRAFTING. See ENGRAFTING.

GRAFTON, a W. co. of N. H., bounded W. by the Connecticut river; area, 1,468 sq. m.; pop. in 1850, 42,848. It has a mountainous surface, containing some of the most celebrated summits of the White mountains, and the Franconia notch. Much of the land is devoted to pasturage, but parts of it are susceptible of high cultivation. The productions in 1850 were 228,799 bushels of Indian corn, 244,177 of oats, 64,859 of wheat, 1,006,287 of potatoes, 1,278,984 lbs. of butter, and 108,001 tons of hay. The county produced more butter, hay, and oats than any other in the state, and more potatoes than any other in the United States. It contained 24 corn and flour mills, 126 saw and planing mills, 16 woollen factories, 16 starch works, 27 tanneries, 8 paper mills, 8 newspaper offices, 88 churches, and 10,836 pupils attending public schools. The northern (N. H.) and the Boston, Concord, and Montreal railroads pass through the county. Organized in 1771. Capital, Haverhill.

GRAFTON, a township of Worcester co., Mass., situated on Blackstone river, 88 m. S. W. of Boston, and comprising several villages, one of which bears the same name; pop. in 1855, 4,409. Its S. part is traversed by Blackstone river and canal and by the Providence and Worcester railroad, its N. part by the Boston and Worcester railroad, and its centre by the Milbury

branch, connecting the 2 other roads. It contains a bank, a loan fund association, and 7 churches, 2 Baptist, 2 Congregational, 2 Methodist, and 1 Roman Catholic. In 1855 it had 7 cotton mills, with \$526,500 capital, manufacturing \$392,613 worth of goods per annum; 1 machine shop, 1 manufactory of agricultural implements, 1 of railroad cars, and several of boots and shoes, the last employing 822 hands, and making \$580,856 worth of boots and shoes.

GRAHAM, ISABELLA, a Christian philanthropist, born in Lanarkshire, Scotland, July 29, 1742, died in New York, July 27, 1814. Her maiden name was Marshall. In 1765 she was married to Dr. John Graham, an army surgeon, and accompanied him with his regiment to Canada, and afterward to Antigua, where he died in 1774. Returning to Scotland, she engaged successfully in teaching, first in Paisley, and subsequently in Edinburgh. In 1789 she came to New York, and established a seminary for young ladies. Before leaving Scotland she originated the "Penny Society," now known as the "Society for the Relief of the Destitute Sick;" and after coming to this country, it was through her efforts in part or entirely that the "Society for the Relief of Poor Widows," the "Orphan Asylum Society," the "Society for Promoting Industry among the Poor," and the first "Sunday School for Ignorant Adults," were established in New York. She aided also in organizing the first missionary society and the first monthly missionary prayer meeting in the city; was the first president of the Magdalen society; systematically visited the inmates of the hospital, and the sick female convicts in the state prison; and to hundreds of families distributed Bibles, and tracts prepared under her own direction, long before there was a Bible society or tract society in New York. She not only gave a 10th part of all her earnings to pious and charitable purposes, but lent small sums, without interest, to persons in humble life, to aid them in their business and in sustaining their families; and in various other ways was as indefatigable in her charity and benevolence, as she was eminent for her piety and social virtues. A memoir of her life and character has been published by the American tract society.

GRAHAM, SIR JAMES ROBERT GEORGE, an English statesman, born in Cumberland, June 1, 1792. He was educated at Westminster school, and at Queen's college, Cambridge, and at the outset of his career was creditably employed in a diplomatic capacity in southern Europe. In 1818 he entered parliament as an ultra-liberal member from Hull, and during the next 2 years showed considerable ability as a debater. At this time and later he wrote and spoke in favor of repealing the corn laws. In the general election of 1826, after an absence of 6 years from parliament, he was returned by the radicals of Carlisle, and upon the accession of Earl Grey to office in 1830 was appointed first lord of the admiralty. He supported the reform bill and other liberal measures of the Grey cabinet, but

resigned office in 1834, and 3 years later was elected in the conservative interest from the Pembroke district. Upon the formation of Sir Robert Peel's ministry in 1841 he was appointed secretary of state for the home department, from which office he retired in 1846. In the Aberdeen cabinet, in 1853, he was reinstated in his former office of first lord of the admiralty, which he retained until Feb. 1855. As a cabinet minister, Sir James has evinced much industry and business capacity, although his measures have in some instances resulted disastrously. In the admiralty he aimed at retrenchments in the naval expenditures the wisdom of which has been severely questioned, and projected a number of improvements in naval architecture which have proved failures. Sir Charles Napier ascribed the inefficiency of the fleet which sailed under his command to the Baltic in 1854 to the incompetency of Sir James Graham, against whom in parliament he directed a bitter attack. While in the home department he rendered himself very unpopular by causing letters addressed to Mazzini to be opened and copied at the general post office, for which he was severely attacked by "Punch" and other liberal prints. After declaring to his constituents in 1841 that he intended to support the corn laws, he aided Sir Robert Peel in repealing them. Upon the dissolution of the Peel cabinet he remained for some years among the so called "Peelites," and of late has announced himself as "one of the great liberal party." In the general election of 1859 he was again returned to parliament from Carlisle.

GRAHAM, JOHN, Viscount Dundee and Lord Graham of Claverhouse, by which latter title he is most generally known, a Scottish soldier, born near Dundee in 1648, killed at the battle of Killiecrankie, July 27, 1689. He was educated at St. Andrew's university, and about 1670 passed over to the continent, where for many years he pursued the career of a soldier of fortune, first in the French and subsequently in the Dutch service. Returning home in 1677 with favorable recommendations from the prince of Orange to Charles II., he was appointed captain of one of the 8 troops of horse that the king was then raising to enforce compliance with the established religion in Scotland. In this employment he won an unenviable notoriety for the merciless severity with which he pursued the Covenanters of the western lowlands, where for many generations his name was held in execration. His troopers, selected from the most profligate of the church party, zealously seconded the efforts of their leader, whom they equalled in barbarity and profanity. In June, 1679, Claverhouse was defeated by a body of Covenanters at Drumclog, but he was revenged subsequently at the battle of Bothwell bridge, and by inflicting new cruelties upon the inhabitants of the western shires. In Nov. 1688, a week after the landing of the prince of Orange, he was created by James II. Viscount Dundee and Lord Graham of Claverhouse. Attending the

convention parliament which assembled in Edinburgh soon after to arrange the succession to the crown, he became alarmed for his personal safety, and fled with a body of horse from the city. Putting himself at the head of several disaffected highland clans and of a body of Irish marauders, he routed the king's troops commanded by Gen. Mackay, in the pass of Killiecrankie, but fell by a chance shot in the moment of victory. His qualities as a soldier and a politician, which were conspicuously displayed during the last few months of his life, have diverted attention somewhat from his many criminal acts; and Sir Walter Scott, in his "Old Mortality," has presented a vigorous though highly colored picture of him. One of the latest attempts to relieve his character from the odium which attaches to it was made by Professor Aytoun in the appendix to his "Lays of the Scottish Cavaliers." See also "Memorials and Letters illustrative of the Life and Times of John Graham of Claverhouse, Viscount Dundee, by Mark Napier," vol. i. (Edinburgh, 1859).

GRAHAM, JOHN ANDREW, LL.D., an American advocate and author, born in Southbury, Conn., June 10, 1764, died in New York, Aug. 9, 1841. Immediately after his admission to the Connecticut bar in 1785, he removed to Rutland, Vt. He was a zealous adherent of the Protestant Episcopal church, and in 1794 put in nomination for bishop of Vermont the Rev. Samuel Peters, LL.D., who was his intimate friend. The nomination was followed by an immediate formal election, and Dr. Peters being in England, Mr. Graham was despatched thither as agent of the diocese to make application to the English bishops for his consecration, and he urged the suit "most ably and assiduously," but unsuccessfully. He returned to Vermont and reported his proceedings to the Episcopal convention in 1795. In 1796 he returned to England, and in 1797 there published, in admirable style with a portrait of himself, an 8vo. volume entitled "Descriptive Sketch of the Present State of Vermont," and received the degree of LL.D. from the royal college of Aberdeen. Returning to Rutland, Vt., in 1800, he resided there until 1803, when he removed to Washington, D. C., and from thence to New York, where he lived from 1805 till his death. He became distinguished in New York for his ability in the defence of criminals, and a small volume of his ablest speeches was published in 1812. In 1828 he published his "Memoirs of John Horne Tooke," in which he endeavored to prove the identity of Tooke with the celebrated Junius.

GRAHAM, JOSEPH, an American revolutionary soldier, born in Pennsylvania, Oct. 18, 1759, died in Lincoln co., N. C., Nov. 12, 1836. In early childhood he removed with his mother to Charlotte, N. C., where he was educated. At the age of 19 years (1778) he entered the 4th regiment of the regular troops of N. Carolina, and in the latter part of that year and in the succeeding year was actively employed in S. Carolina and Georgia under Gen. Lincoln. In 1780,

as adjutant of the Mecklenburg regiment, he engaged in a desperate encounter with Tarleton's troops at Charlotte, where he received a severe wound. He recovered in time to participate in the next southern campaign, and commanded with brilliant success in many partisan engagements. He was subsequently sheriff of Mecklenburg co., and commanded a body of N. Carolina militia in the Creek war of 1814.—**WILLIAM ALEXANDER**, son of the preceding, an American statesman, born in Lincoln co., N. C., Sept. 5, 1804. He was trained to the law, and in 1833 entered public life as a member of the lower branch of the state legislature, of which he was several times elected speaker. He represented N. Carolina in the U. S. senate between 1841 and 1848, and from Jan. 1845, to Jan. 1849, occupied the position of governor of the state. Upon the accession of Mr. Fillmore to the presidential chair he received the appointment of secretary of the navy, an office which he filled until June, 1852, when, upon receiving from the whig national convention at Baltimore the nomination of vice-president, he tendered his resignation.

**GRAHAM, SYLVESTER**, an advocate of the vegetarian dietetic theory, born in Suffield, Conn., in 1794, died in Northampton, Mass., Sept. 11, 1851. He was the 7th and youngest child of the Rev. John Graham, who, after graduating at Oxford, Eng., came to Boston, Mass., and afterward settled at Suffield. Sylvester inherited the dyspeptic and rheumatic infirmities of his father, and in childhood was extremely feeble. He lived with an uncle several years, during which time he performed all the drudgery of a farm laborer. In his 12th year he was sent to New York to school, and at 14 he went to learn the paper-making business, at which he remained only 4 weeks. After living for a brief season with a farmer, and then travelling for a short time with a horse dealer, he entered a country store as clerk in 1810, and in the same year was clerk for a few months with a merchant in New York. At this time, being in his 16th year, symptoms of consumption made their appearance, and he was again sent into the country. In his 19th year he began in earnest the cultivation of his mind, and after studying arduously for 4 months he was recommended by his master to become a teacher, which he did successfully until illness obliged him to relinquish the work. In 1823 he entered Amherst college with the design of qualifying himself for the ministry; but having exhibited great powers of elocution, with the ability to move the hearts of his audience, and throw his whole soul into his orations, he was denounced as a stage actor and mad enthusiast. In 1826 he married a Miss Earle, and soon after became a preacher in the Presbyterian church. Being much interested in the temperance cause, he was engaged in 1830 as a lecturer by the Pennsylvania temperance society. His labors in this field led him to investigate the science of physiology, and subsequently to study anat-

my. His studies were unremitting. He was soon led to believe that no permanent cure for intemperance could be found except in such changes of personal and social customs as would relieve the human being of all desire for stimulants. This idea was soon applied to medicine, so that the prevention and cure of disease, as well as the remedy for intemperance, were seen to consist mainly in the adoption of correct habits of living, and the judicious adaptation of hygienic agencies. These ideas were elaborated into an "Essay on the Cholera," published in 1832, and a course of lectures which were delivered in various parts of the country, and subsequently published under the title of "Graham Lectures of the Science of Human Life" (2 vols., Boston, 1839). This has been the leading text book of all the dietetic and nearly all the health reformers since. He was also the author of a treatise on "Bread and Bread Making," and a "Lecture to Young Men on Chastity." For a few years previous to his death he was occupied in the production of "The Philosophy of Sacred History" (12mo.), the leading design of which was to harmonize the teachings of Scripture with his published views on physiology and dietetics. He lived, however, to complete only one volume of the work, which was published after his death.

**GRAHAM ISLAND**, a volcanic island, which appeared above the surface of the Mediterranean in July, 1831, and after being visible for about 3 months, disappeared toward the close of October. The locality was about 80 m. S. W. of Sciaccia in Sicily, and 88 m. N. E. of Pantelleria, lat.  $37^{\circ} 8' 30''$  N., long.  $12^{\circ} 42' 15''$  E. The depth of water was found a few years before, by the soundings of Capt. W. H. Smyth, to exceed 100 fathoms. An earthquake shock was experienced over the spot 3 weeks before the appearance of the island; and on July 10, a few days before land was observed, a water spout was seen by a Sicilian navigator, which was succeeded by an immense column of steam rising to the estimated height of 1,800 feet. Fire was seen on the 17th by the master of the brig *Adelaide* of London. On the 18th the Sicilian captain, repassing the spot, found a small island, 13 feet out of water, with a crater in its centre, ejecting volcanic matter and immense columns of vapor. About the same time Commander C. H. Swinburne, R. N., reported it to be 70 or 80 yards in external diameter, and its lip as thin as it could be consistent with its height, which might be 20 feet above the sea at the highest point. On July 23, as reported and sketched by Mr. Russell of H. M. ship *St. Vincent*, the circumference of the island was  $\frac{1}{4}$  of a mile, and its highest point 80 feet above the water. At that time columns of water were ejected to the height of 800 to 1,000 feet, and scoriae were thrown, it was supposed, twice as high. The first landing was effected on Aug. 8, by Capt. Senhouse of the *St. Vincent*, who hoisted the British flag, and called the island by the name which was afterward adopted by the royal and

geographical societies. The island was then from  $1\frac{1}{2}$  to  $1\frac{1}{4}$  miles in circumference, and its highest point about 180 feet above the surface. A deep circular crater lay between two longitudinal hills, by which it was entirely shut in except for about 250 yards on its S. E. side, where a bank of only 3 feet in height separated it from the sea. The crater was filled with boiling salt water of dingy red color, from which arose a nauseous and oppressive vapor. The only gas evolved in large quantity, according to the paper of Dr. John Davy ("Philosophical Transactions," 1832, p. 243), was carbonic acid. Some authorities have made it about this time to be 3 miles in circumference with a maximum height exceeding 200 feet. On Aug. 25 it was reduced to 2 miles, and on Sept. 8 to only  $\frac{2}{3}$  of a mile, with a maximum height of 107 feet. The crater was then 780 yards in circumference. The materials which composed the island were *adria*, pumice, and lapilli, arranged in regular strata which sloped steeply away from the crater. The only substances found not of volcanic nature were fragments of dolomitic limestone. No lava was ever seen to flow, and no solid beds were formed which could resist the action of the waves. By these all the loose materials were washed away, so that at the close of October it may be said to have entirely disappeared. Two years afterwards Capt. Swinburne found a dangerous reef at the spot, in the centre of which was a black rock of the diameter of 26 fathoms, from 9 to 11 feet under water. Around it, extending 60 fathoms to deep water, are banks of black volcanic stones and loose sand. The black rock in the centre is supposed by Lyell to be solid lava which rose up in the crater and became consolidated and now exists as a dike. Another shoal 450 feet S. W. of the great reef marks the spot where another outbreak of boiling water and steam was observed in the month of August during these convulsions. This island has been called by no fewer than 7 names, and is sometimes still known by that of *Ferdinanda*.

GRAHAME, JAMES, a Scottish poet, born in Glasgow, April 22, 1765, died near that city, Sept. 14, 1811. He was educated at the university of Glasgow, went to Edinburgh, and became a writer to the signet in 1791, and a member of the faculty of advocates in 1795. But the legal profession had always been distasteful to him, and in the spring of 1809 he went to England, where he was ordained a minister of the established church. His principal poetical works are: "The Sabbath," "Mary, Queen of Scots," "British Georgics," and "The Birds of Scotland."

GRAHAME, JAMES, a Scottish historian, born in Glasgow, Dec. 21, 1790, died in London, July 3, 1842. He studied at St. John's college, Cambridge, but soon terminated his connection with that institution, and after preparatory studies was in 1812 admitted an advocate at the Scottish bar. For nearly 14 years he practised his profession, until he was obliged through

ill health to seek a more genial climate. Settling in the south of England in the spring of 1826, he devoted himself to the preparation of a history of the United States, a work which he had commenced about the beginning of the previous year. His early education, his religious views, which were those professed by the Scotch Covenanters and Puritans, and his zeal in the cause of civil liberty, combined to render the subject attractive to him, and his interest and enthusiasm increased with the progress of the work. In 1827 the first two volumes were published, and in 1836 a new edition appeared (4 vols. 8vo.), bringing the history down to the year 1776. The thoroughly American spirit in which the work was written interfered with its success in England, and for several years it attracted little notice in the United States. In 1839, however, the author received from Harvard college the degree of LL.D., and in 1841 a genial notice of his history from the pen of William H. Prescott appeared in the "North American Review." Four years later an edition of his work was published in Philadelphia (4 vols. 8vo.), succeeded in 1846 and 1848 by editions in 2 vols. each, that of 1846 containing a memoir of the author by Josiah Quincy. Mr. Quincy also published a work entitled "The Memory of the late James Grahame, the Historian of the United States, vindicated from the Charges of Mr. Bancroft" (8vo., Boston, 1846). In 1837 Mr. Grahame, who had for some years previous resided at Nantes, France, was urged to continue his history to the close of the revolutionary war. He began to collect materials for this undertaking, the design of which excited in him an unusual degree of interest, when he was compelled by ill health toward the close of the year to abstain from literary labor of all kinds. His last work was a pamphlet entitled, "Who is to Blame? or Cursory Review of the American Apology for American Accession to Negro Slavery" (8vo., London, 1842). The subject was one which had excited his attention for many years, and in reference to which he had testified his sincerity by joining with his children in liberating a number of slaves they had jointly inherited from his wife. He wrote in addition pamphlets on various social and religious questions, including a "Defence of the Scottish Presbyterians and Covenanters against the Author of the 'Tales of my Landlord,'" but the absorbing study of the best years of his life was American history, and such was his predilection for the American people that he delighted to call himself an American by adoption, and declared that his daughter, whom he tenderly loved, was "hardly dearer to him than America and American renown." His "History of the United States" is written, according to the testimony of Chancellor Kent, "with great gravity and dignity, moderation and justice."

GRAHAMSTOWN, a town of Cape Colony, capital of the district of Albany, 22 m. N. N. W. of Bathurst, and 600 m. distant from Cape

Town; pop. estimated at 6,000,  $\frac{1}{4}$  of whom are British. It is situated in a fertile plain, surrounded by hills covered with grass, but almost destitute of trees. It is the see of a bishop, whose authority extends over the Eastern Province and Caffraria.

GRAIN (Lat. *granum*, a seed), the smallest measure of weight in use, about equal to that of a kernel of wheat. A statute passed in England in 1266 ordained that 32 grains of wheat, taken from the middle of the ear and well dried, should make a pennyweight, 20 of which should make an ounce, 12 of which should make a pound. The pound, therefore, consisted then of 7,680 grains, but afterward of only 5,760, in consequence of the division of the pennyweight into 24 instead of 32 grains. The present troy pound is fixed at 5,760 grains, and the avoirdupois pound at 7,000 grains.

GRAKLE, a name given to conirostral birds of the family *sturnida* or starlings, and sub-family *graculina*; and to the sub-family *quiscalina* of the American family *icterida*. The *graculina*, or grakles proper, are contained in the single genus *gracula* (Linn.), embracing 5 or 6 species in India and its archipelago; they are vegetable feeders, and celebrated for their powers of song and speech, especially the *G. religiosa* (Linn.), or mina bird, under which title they will be described. In the United States the name of grackle is applied to the *quiscalina* or boat-tails, which include the genera *scolecophagus* (Swains.), *quiscalus* (Vieill.), and *scolecophagus* (Swains.). The genus *scolecophagus* has the bill shorter than the head, nearly straight, slender, with the edges inflexed; the wings moderate and pointed, the 1st quill shorter than the 2d, 3d, and 4th, which are longest; the tail shorter than the wings, flat and nearly even; tarsi as long as the middle toe, with broad scutellæ; toes long and slender, the hind toe long, and the slender claws sharp and slightly curved. The rusty grackle (*S. ferrugineus*, Swains.) is about 9 inches long, with an extent of wings of 14 inches, the bill 1 inch, and the tarsus  $1\frac{1}{2}$ ; the plumage is soft and glossy, of a deep black color, with greenish and bluish reflections; the female is smaller, of a general brownish or rusty black color, the feathers beneath margined with brownish; the young resemble the female, with the head, neck, and lower parts lighter brown, and the rump tinged with gray; in the autumn and winter even the males become rather rusty. They are found from the Atlantic coast to the Missouri, migrating to the far north in the spring to breed, and to spend the summer in search of worms and insects; in the autumn they return to the south in small flocks with the cow-bunting and red-winged blackbird, with which they associate until spring returns. The flight is quick and undulating, and the walk is graceful, the tail being jerked up and down at every step. They frequent the corn fields and rice plantations, where they do but little mischief; they are fond of the company of cattle, picking out

the grain from their droppings; in the winter they resort to marshes and water courses, feeding on aquatic insects and small mollusks. Their note is a kind of chuck, but during the breeding season they are noisy and have a lively and agreeable song. They are not very shy. The nest is built on low bushes in moist places, of coarse materials, and the eggs, 4 or 5, are light blue, streaked and dashed with lines of brown and deep black. The Mexican grackle (*S. cyanocephalus*, Cab.) is a somewhat larger bird, with a stouter bill, and a purplish gloss confined to the head and neck; it is found from Minnesota to the Pacific, and as far south as Mexico.—The other grakles belong principally to the genus *quiscalus*, characterized by a bill as long as the head, broad, with the edges inflexed, and the tip of the upper mandible overhanging the under; the wings moderate, the 2d, 3d, and 4th quills the longest; the tail longer than the wings, graduated and the sides turned upward; the tarsi as long as the middle toe, strong, and greatly scutellated; the toes strong, and the hind one long, all scutellated; claws short, robust, and slightly curved. There are more than 12 species described, which migrate from north to south according to the seasons; in winter their immense flocks are very destructive on plantations, while in spring they are useful to man in devouring from the fields and ploughed lands great numbers of worms, grubs, and caterpillars, injurious to vegetation; they pull the young corn soon after it has sprouted, and also attack it when in the milky state. The species found in the United States are best distinguished by the size and form of the tail. The largest is the great-tailed grackle (*Q. macrourus*, Swains.), 18 inches long, with an extent of wing of about 27, and the tail  $9\frac{1}{2}$ ; the color is shining black, with purple and green reflections, and the feathers of the head soft and velvety; it is found from the valley of the Rio Grande in Texas southward. The boat-tailed grackle, great crow-blackbird, or jackdaw as it is sometimes called (*Q. major*, Vieill.), is about 16 inches long, with an extent of wings of 2 feet; the color is shining black, the purple gloss being confined to the head, neck, and fore part of the breast, elsewhere with green reflections; the crown feathers are coarse and stiff. Their habits are the same as those of the other grakles; they seek their food among the salt marshes and along the muddy shores, eating fiddler crabs, insects, worms, shrimps, and other aquatic animals; they are fond of the eggs of other birds, and in the autumn commit great depredations in the corn and rice fields. They are very shy, and fly at a considerable elevation and for long distances; the notes are harsh and shrill, though rather pleasing in the love season. The nest is large, of coarse materials, placed on tall reeds growing in the water, on smilax bushes, and on live oaks, where they breed in communities; they begin to lay about the 1st of April, sometimes earlier; the eggs, 4 or 5, are dull white with irregular streaks of brown

and black; only one brood is raised in a season. This species is found in the southern Atlantic and gulf states, near the coast, and in Texas. During the breeding season, the sides of the tail are turned upward, whence its common name has been derived. The purple grackle, or common crow-blackbird (*Q. versicolor*, Vieill.), is 13 inches long, with an extent of wings of 19; the head and neck are steel blue, the rest of the plumage with varied reflections of bronze, golden, green, violet, and copper; the female is smaller, with a less brilliant and more brownish plumage. The habits are the same as in the others of the genus; the friends of the farmer in the spring by devouring grubs, in the summer and early autumn they dispute the possession of the corn fields with the planters, who seek to frighten them by rattles and shouts, and to destroy them by guns and all sorts of devices; their mischief is so great that the corn is sometimes steeped in saline and bitter solutions to prevent it from being pulled up; in cold weather they feed upon beech nuts, acorns, and the refuse of the cattle pens. In the southern states the nest is generally in a hole in a decayed tree; the eggs, 4 to 6, are bluish, with brown and black streaks and blotches; in the north, pine trees are favorite places for their nests. It is found in the Atlantic states, from New England to Florida, and on the high central plains of the continent. The flesh of all these grackles, when in good condition, and especially when young, is considered by some as an excellent material for a pot-pie.—The genus *scaphidurus* has a long bill, with the culmen advancing on the forehead, and sloping to an acute and curved tip; the wings are long and pointed, the 1st quill the longest; the tail lengthened, graduated, with the sides turned upward. They are found in the West Indies and in tropical South America.

GRAMMAR. See LANGUAGE.

GRAMME, the French unit of weights, equal to 15.4325 grains troy, or very nearly  $\frac{1}{16}$  of a dram avoirdupois. It is the weight of a cubic centimetre of distilled water at the temperature of maximum density, 4° C., or 39.2° F. The gramme is divided, according to the French system, into 10 decigrammes, 100 centigrammes, or 1,000 milligrammes. Its multiples by 10 are successively deca-, hecto-, kilo-, and myriagrammes. The weight of the kilogramme, or 1,000 grammes, is equal to 2.6793 lbs. troy, or 2.2046 lbs. avoirdupois. In rough estimates 50 kilogrammes are often conveniently taken as equivalent to 1 cwt., being only  $\frac{1}{4}$  lbs. short of this, and 1,000 kilogrammes as 1 ton, the deficiency being only 35.4 lbs.

GRAMMONT, or GRAMONT, the name of an ancient French family which traces its origin back to the 14th century, takes its name from the seignorial estate of Gramont in Lower Navarre, and has produced several distinguished men, bishops, dukes, marshals, and peers of France.—Duke ANTOINE III. distinguished himself in several campaigns during the reigns of Louis XIII.

and Louis XIV.; became marshal of France in 1641; was commissioned in 1660 to bring from Spain the bride of the latter, the infanta Maria Theresa, and died in 1678. He left personal *Mémoires*, which were published by one of his sons, and are not devoid of interest.—Count PHILIBERT, brother of the preceding, born in 1621, died Jan. 10, 1707. He is renowned, not for his military exploits, which were of a very common order, but for his innumerable love affairs, gambling adventures, and intrigues, which have been handed down to posterity in the sprightly narrative by his brother-in-law Anthony Hamilton. This hero of fashionable licentiousness, after figuring indifferently in several campaigns, was ordered to leave France in 1662, because he had been presumptuous enough to pay his homage to Mlle. Lamothe Houdancourt, upon whom Louis XIV. had fixed his affections. He then repaired to the frivolous court of Charles II. of England, where he became the favorite of many ladies of rank and beauty. He was stopped at last in his career of debauchery by an enforced marriage with Miss Hamilton. He returned to France with his wife, who was appointed lady in the household of Queen Maria Theresa. He was 80 years old when, to divert him, his brother-in-law undertook the *Mémoires* which were to perpetuate his name.

GRAMPIANS, THE, a range of mountains traversing Scotland diagonally from S. W. to N. E. for a distance of 150 m., and forming the natural boundary between the highlands and the lowlands. Beginning in Argyleshire, on the W. coast, near the S. W. extremity of Loch Awe, they pass along the N. boundary of Perthshire, including the Ben Lomond hills to the S., and at Cairn Ealer divide into two branches, which pass to the sea respectively on the N. and S. sides of the river Dee. The term is not strictly limited in its application, but in its widest usage it includes all the highest mountains of Scotland, excepting Ben Nevis. Several of its summits, as Ben Cruachan, Ben Lomond, Schiehallion, Cairngorm, Cairntoul, and Bennabuir, rise to a height of more than 3,000 feet.

GRAMPUS, a porpoise-like cetacean, belonging to the genus *phocæna* (Ouvier); English writers, however, make a generic name of the word grampus, calling the animal *G. orca* (Fabr.). The name seems to be a corruption of the French *grand poisson* (large fish), to which its size well entitles it. Other names are finner and black fish whale, from its dorsal fin and prevailing color; killer or thrasher, from its alleged habit of attacking and killing the whale. It is generally considered the same as the *orca* of Fabricius and Lacépède, the *butakopf* of Anderson, and the *épée de mer* and *épaularde* of the French. It attains a length of 25 to 30 feet, with a circumference of 10 or 12; the snout is short and rounded, the lower jaw broader and shorter than the upper; the teeth are about 44, 22 above and 22 below, large, strong, conical, and somewhat hooked; the so called dorsal fin, near the middle of the back, is 4 feet high, and the pectorals



are large and oval; the tail is lunate, thick, and powerful. The color is black above, suddenly changing to white on the sides and beneath; a large white patch behind and above the eyes. It is occasionally seen on our coast, and not unfrequently on the shores of Europe and in the middle Atlantic; its favorite haunts are the northern regions, in the vicinity of Greenland, Spitzbergen, and Davis straits. They are often met in small herds of 6 or 8, chasing each other as if in sport; they are swift and strong, which renders their capture difficult, and they yield comparatively little oil. The grampus is exceedingly voracious and entirely carnivorous, devouring large fish, such as cod, halibut, skates, turbot, &c., smaller cetaceans, and even seals. American whalers call it killer and thrasher, and affirm that a herd of them will surround a large whale, bite and tear away its flesh with their powerful teeth, and finally weary and destroy it; the accounts of such cetacean combats are doubtless much exaggerated by voyagers, but from the size, strength, and voracious habits of the grampus, no doubt even the giants of the deep sometimes fall victims to their hungry herds. The oil, though small in quantity, is of excellent quality. Gray, in the *Spicilegium Zoologicum*, vol. ii., describes other species, as *G. intermedius*, *Heavisidii*, and *obscurus*, the last two from the Cape of Good Hope; all the species are frequently called dolphins, though they have not the prolonged beak of the latter.

GRAN (Hung. *Esztergom*), a county of Hungary, in the district of Pesth, divided by the Danube, which traverses it from W. to E.; area about 400 sq. m.; pop. 64,000, mostly Magyars. The surface toward the centre is flat, in the N. part generally level, and mountainous in the S. The soil, which is generally fertile, produces corn, fruits, and wine, of which the Neszmélyi is favorably known in commerce. Coal, limestone, and gray, red, and variegated marble are found.—GRAN, the capital of the above county, is situated on the right bank of the Danube, crossed here by a bridge, opposite the mouth of the Gran; pop. 11,454. It is the seat of an archbishop, primate of Hungary, and contains many remarkable buildings, of which the palace of the primate, the houses of the chapter, and the cathedral, a magnificent structure, built on an eminence in the Italian style, are most conspicuous. It has also a gymnasium and a theological seminary. The inhabitants are chiefly employed in the manufacture of woollen cloth. Gran is said to have been founded by the Romans. St. Stephen, the first king of Hungary, was born in Gran. It continued to be a most flourishing town until it was destroyed by the Tartars, on their invasion of Hungary, 1241-'43. At a later period it was taken by the Turks, and reconquered in 1688, by John Sobieski, king of Poland.

GRANADA, a city of Nicaragua, on a little bay of Lake Nicaragua, near its N. W. extremity; pop. in 1854, including the suburbs and the municipality of Jalapa, 12,000 to 15,000.

It was founded in 1522 by Hernando de Cordova, on the site of an aboriginal town. At the time of the conquest the country around it was densely populated, and rich in agricultural products. The town increased rapidly, and from its position on the lake soon became the most important commercial point in the province. By means of Lake Nicaragua and the river San Juan it communicated with Carthage and Spain, to which vessels of small size sailed direct, though not without encountering great difficulty and loss of time in the ascent and descent of the river, which was then, as it is now, much obstructed by falls and rapids. It carried on also a considerable trade with the neighboring provinces of Honduras, San Salvador, and Guatemala, and, by the Pacific, with Peru and New Spain. Its wealth attracted the cupidity of the buccaneers, who made one or two successful descents on it from the side of the Pacific, and one by means of the river San Juan and the lake, from the Atlantic. This led to the erection of several extensive fortifications on the river, of which the remains are still conspicuous. In 1854, Granada had 7 churches, a hospital, and nominally a university. It was the seat of several considerable commercial establishments, and was not without many indications of wealth and prosperity. About that period its citizens succeeded in placing one of their own number, Don Fruto Chamorro, in the post of director of the republic. It was alleged that the means adopted to effect this purpose were irregular, and the country soon became embroiled in revolution and civil war. Chamorro belonged to the party styling itself conservative, while his opponents, having their stronghold in the rival city of Leon, called themselves democrats. In attempting to reduce them he was beaten, and driven with his followers into Granada, which he fortified, and there sustained a siege from May, 1854, to February, 1855, during which the city suffered greatly. In 1856, Chamorro having in the mean time died, and the democrats having obtained the aid of William Walker and his followers, the city was taken by surprise, and made the seat of the provisional government established by Walker. It was held by him until 1857, when it was retaken by the combined forces of Guatemala and San Salvador, after a desperate defence by Gen. Henningsen, under whose orders it was almost wholly destroyed. Since the restoration of peace, a considerable part of its former inhabitants have returned, and some attempts have been made toward its restoration. But its position does not fall in the course of modern trade and travel, and it is doubtful if it can ever regain its former wealth and importance.

GRANADA, an ancient kingdom of Spain, in Andalusia, comprising the 3 modern provinces of Malaga, Granada, and Almeria, bounded S. and E. by the Mediterranean; greatest length about 200 m., greatest breadth about 140 m.; area, 9,630 sq. m. The surface is diversified, with lofty mountains, beautiful valleys, and ex-

tensive plains. The Sierra Nevada mountains traverse the territory from E. to W. The summits of this range are crowned with perpetual snow, and one of them, the Cerro de Mulhacen, attains an elevation of 11,660 feet above the sea, and is said to be the highest mountain in Spain. The principal rivers are the Jenil, the Darro, and the Guadalfeo. The climate varies with the elevation of the surface; that of the mountain districts is cold, that of the plains temperate, and that of the valleys hot, sultry, and unhealthy, especially during the prevalence of the wind called *solano*, which blows periodically from the Mediterranean, and is attended with most pernicious effects. The soil is barren or fertile in proportion to the possibility of irrigating it with the waters of the mountain streams. Agriculture forms the great business of the inhabitants. The most considerable manufacture is silk, which in the plain of Granada alone gives employment to 1,500 persons, and consumes annually 120,000 lbs. The wine is in general of inferior quality, but the Tierno, Moscatel, and Malaga are exceptions, and have a high reputation. The sugar cane grown in the neighborhood of Velez-Malaga is deemed fully equal to that of the West Indies for size and juiciness. The import and export trade is not of much importance, and is chiefly carried on through the ports of Almeria and Malaga. This province formed an opulent, civilized, and powerful kingdom under the Moorish dynasty, which was overthrown by Ferdinand the Catholic in 1492.—The modern province of Granada is bounded N. by Cordova, Jaen, and Albacete, E. and S. by Almeria and the Mediterranean, and W. by Malaga; area, 8,622 sq. m.; pop. in 1857, 461,240. It is almost entirely mountainous, the only large tract of level country within its boundaries being the Vega or plain of Granada, 70 m. long by 20 m. broad, near the city of the same name.—GRANADA, the capital of the above province and kingdom, and one of the most famous of the ancient cities of Spain, is situated on two declivities of the Sierra Nevada range, and on the plain which intervenes between them; lat. 37° 18' N., long. 3° 50' W.; pop. in 1857, 100,678. The river Darro flows through it, and falls into the Jenil just outside the walls. The site of the city is 2,445 feet above the sea, and its appearance from a distance is singularly picturesque and beautiful. It is divided into 4 quarters, the city proper, the Alhambra suburb, the Albaycin suburb, and the Antequeruela suburb. The first 3 are partially fortified, but the 4th or Antequeruela quarter is entirely open, and here the working classes generally reside. The streets are narrow and crooked, but the houses are well built, and their antique oriental architecture makes them objects of interest to the stranger. There are several handsome squares and numerous public fountains in the town. It is the public edifices, however, and the monuments of its former splendor, that are the great attractions of Granada, and first among these must be ranked the

Alhambra, or ancient palace of the Moorish kings. (See ALHAMBRA.) Next after this we may place the Gothic cathedral, which is profusely ornamented with jasper and colored marble, and is surmounted with a dome resting on 12 arches, beneath which stands the gorgeously decorated altar. The church of Nuestra Señora de las Angustias is remarkable for its altar and towers; the church of San José, a modern structure, for its elegance. The monastery of San Geronimo contains the tomb of its founder, the famous Gonsalvo de Cordova; but his bones were dug up and cast out by a mob who plundered the convent in 1836. Beside these edifices, Granada contains the unfinished palace of Charles V., the Generalife, a Moorish palace surrounded with gardens and fountains, an episcopal palace, a university, and a general hospital, as well as many conventual establishments for both sexes. The chief manufactures are silk, woollen stuffs, hats, paper, saltpetre, and gunpowder. The trade is insignificant, and the roads leading to the city are so wretched that in the rainy season they are almost impassable. Granada was founded by the Moors in the 10th century, and from 1235 was the capital of the kingdom of Granada till its subversion in 1492, when it was taken by Ferdinand and Isabella after a siege of one year. At the height of its splendor it is said to have contained 500,000 inhabitants.

GRANADA, NEW. See NEW GRANADA.

GRANBY, JOHN MANNERS, commonly called marquis of, an English general, born Jan. 2, 1721, died in Scarborough, Oct. 19, 1770. He was the eldest son of the 3d duke of Rutland, was educated at Eton and at Trinity college, Cambridge, and during the rebellion of 1745 entered the army and raised a regiment of foot at his own expense. In 1759, being then a lieutenant-general, he was sent to Germany as second in command, under Lord George Sackville, of the troops destined to coöperate with the king of Prussia. Lord George having resigned in consequence of being charged with misconduct at the battle of Minden, Granby succeeded to the chief command of the British troops, and served with great reputation during the remainder of the 7 years' war. At Warburg, Kirch-Denkern, Gräbenstein, and Homburg, he greatly distinguished himself; and for the brilliant manner in which he led the cavalry at the first of these actions he was highly praised in the despatches of Prince Ferdinand. In 1768 he became master-general of the ordnance, and in 1766 commander-in-chief of the forces of Great Britain. He also served several terms in parliament, but shortly before his death resigned all his employments. His eldest son succeeded to the dukedom of Rutland. The marquis of Granby's reputation for military capacity has been very much exaggerated, and beyond dashing bravery and zeal he exhibited none of the qualities of a great commander. He was a man of great benevolence, and careful of his troops, and although the object of vin-

dictive attacks from "Junius," he enjoyed a popularity exceeding that of any of his military contemporaries.

**GRAND HAVEN**, the capital of Ottawa co., Mich., situated on Lake Michigan near the mouth of Grand river, 32 m. N. W. from Lansing and 92 from Detroit by railroad; pop. in 1859, 3,000. It is the W. terminus of the Detroit and Milwaukee railroad, which has here an immense depot and a pier 3,000 feet long, extending into the lake. Steamers cross every 12 hours to Milwaukee, and there are lines of steamers to Chicago, Buffalo, and Detroit. The principal articles of export are timber, staves, shingles, fish, leather, gypsum, stucco lime, and flour. The exports in some years have exceeded \$1,000,000 in value. There are a Presbyterian, a Congregational, and a Dutch Reformed church, 2 newspaper offices, several saw mills, a planing mill, a tannery, warehouses, &c.

**GRAND ISLE**, a N. W. co. of Vt., consisting of a number of islands in Lake Champlain, and the S. part of a peninsula jutting into the lake from Canada, between Richelieu or St. John's river and Missisquoi bay; area, about 77 sq. m.; pop. in 1850, 4,145. The surface is undulating and the soil fertile. The county is famous for its orchards, which yield the finest apples in the state. The productions in 1850 were 23,245 bushels of Indian corn, 31,324 of wheat, 81,027 of oats, 70,391 lbs. of butter, 98,225 of wool, and 6,980 tons of hay. There were 5 churches, and 1,364 pupils attending public schools. The lake is here navigable by vessels of 90 tons, and the Vermont central railroad crosses the N. part of the county. Capital, North Hero.

**GRAND RAPIDS**, a city and the capital of Kent co., Mich., situated on the rapids of Grand river, 38 m. from Lake Michigan, and 60 m. N. W. from Lansing; pop. in 1859, 10,000. It is on the Detroit and Milwaukee railroad, which extends from Detroit to Grand Haven at the mouth of the river, and is distant from Detroit by rail 157 m. Steamboats connect it with the lake, and the rapids supply it with abundant water power, so that it is one of the most thriving trading and manufacturing cities in the state. Salt, gypsum, limestone, and pine timber are plentiful in the vicinity. The city is built on both banks of the river, which is here about 900 feet wide, in a pleasant and healthy situation. It contains the county buildings, churches of different denominations, 5 newspaper offices, and a great number of stores and factories, and is the seat of St. Mark's college, under the charge of the Episcopalians, founded in 1850. On the W. bank of the river there are several Indian mounds. The city was first settled in 1838, and incorporated in 1850.

**GRAND RIVER** (Ind. name, *Washtenong*), a river of S. Michigan, and the largest stream which lies wholly in that state. It rises in the S. E. part of the lower peninsula, in two branches which unite near Jackson, and after a N. W. and W. course of about 270 m., including its numerous windings, it discharges into

Lake Michigan at Grand Haven. It is about 950 feet wide at its mouth, and deep enough for vessels of less than 12 feet draught. Large steamboats ascend a distance of 40 m. to the rapids, where the river has a fall of 18 feet in a mile; and small boats ply between the head of the rapids and Lyons, about 50 m. further. The principal affluents of Grand river are the Rogue, Flat, Maple, Looking-glass, and Red Cedar from the north, and the Thornapple from the south. Jackson, Lansing, Grand Rapids, and Grand Haven are the chief towns on its banks.

**GRAND TRAVERSE**, a N. W. co. of the S. peninsula of Mich., having Lake Michigan on the W. and N., and Grand Traverse bay on the N. E.; area, 1,224 sq. m. It is drained by Grand Traverse river, which enters the bay of the same name. The surface is undulating, and dotted over with a great number of small lakes. Organized in 1851. Capital, Grand Traverse City.

**GRANDEE** (Sp. *grande de España*), the highest rank of Spanish nobility. The grandees of Spain were the great nobles descended from the ancient chief feudatories of the crown, and from members of the royal family. They had the right to levy soldiers under their own banner, were free from taxes, and could not be subjected to the jurisdiction of any civil or criminal court without the express command of the king. They also claimed the right to make war upon the king without incurring the guilt of treason. As the power of the Spanish monarchs grew absolute the privileges of the grandees were restricted, till little was left but the right of wearing their hats in the royal presence, and of being saluted with military honors by the guards at the royal palace. The Spanish grandees considered themselves superior in rank to all the other nobility of Europe, and second only to princes of royal blood. On public occasions the order of precedence placed them immediately next to the high prelates. Many of the grandees had no title; others had the titles of count, marquis, and duke, and some of these possessed enormous estates, stretching over whole provinces. Among the richest of the grandees were the dukes of Medina Celi, Alva, Ossuna, Altimira, Infantado, and Arcos. The duke of Arcos, who died in 1780, maintained 3,000 servants. Under the present constitution of Spain the grandees have no political privileges.

**GRANDPRÉ**, **LOUIS MARIE JOSEPH OHLER**, count de, a French navigator and traveller, born in St. Malo, May 7, 1761, died in Paris, Jan. 7, 1846. After a long experience on the sea as a trader, he entered the navy, and at the end of 15 years' service was admitted to the *hôtel des invalides*, where he breathed his last in a state of destitution. He published the following books of travel: *Voyage à la côte occidentale d'Afrique, fait dans les années 1786 et 1787* (2 vols. 8vo., Paris, 1801), in which he gives a graphic description of the parts of Congo frequented by Europeans, with an interesting account from his own experience of the slave

trade before the French revolution, and of the means of suppressing it; *Voyage dans l'Inde et au Bengale, fait dans les années 1789 et 1790* (1801), followed by *Voyage dans la Mer Rouge*; and translations of John Barrow's "Travels in Southern Africa" (1801), and Major Taylor's "Travels in India" (2 vols. 8vo., Paris, 1806). He also published a *Dictionnaire universel de géographie maritime* (2 vols. 4to., 1803), an *Abrégé élémentaire de géographie physique* (8vo., 1825), a *Répertoire polyglotte de la marine* (2 vols. 8vo., 1829), and many valuable essays, among them a *Mémoire sur l'emplacement que l'île Atlantide peut avoir occupé entre l'ancien et le nouveau monde*. According to his system, this famous island embraced all the space included between the Bermudas, Azores, Canaries, and Cape Verd islands.

GRANGER, a N. E. co. of Tenn., bounded N. W. by Clinch river, and S. E. by Holston river; area, about 830 sq. m.; pop. in 1850, 12,870, of whom 1,035 were slaves. The surface is hilly, Clinch mountain crossing the county from N. W. to S. E. The river bottoms are fertile, and the high lands are rich in iron and other ores. The productions in 1850 were 488,968 bushels of Indian corn, 29,452 of wheat, 142,425 of oats, 20,711 of sweet potatoes, and 15,196 lbs. of tobacco. There were 25 corn and flour mills, 6 saw mills, 5 tanneries, 82 churches, and 1,636 pupils attending public schools. Holston river is here navigable by steamboats. Capital, Rutledge.

GRANGER, GIDKON, postmaster-general of the United States, born in Suffield, Conn., July 19, 1767, died Dec. 31, 1822. He was graduated at Yale college in 1787, and having been admitted to the bar, rose to eminence in his profession, and was elected a member of the legislature of his native state. He took a deep interest in the question of education, and had an active part in establishing the Connecticut school fund. In 1801 President Jefferson appointed him postmaster-general in place of Mr. Habersham of Georgia. He retained office during both Jefferson's terms, and was reappointed by President Madison, whose policy he nevertheless opposed, and was consequently displaced in 1814, soon after Madison's second inauguration. He then removed to Canandaigua, N. Y., and was chosen a member of the senate of the state of New York in 1819. He promoted internal improvements, and gave 1,000 acres of land to further the construction of the Erie canal. Mr. Granger wrote essays on the school fund, in support of President Jefferson in 1809, and in favor of Gov. Clinton's administration in 1820.

GRANIOUS (mod. *Karakasu*), in ancient geography, a small river of Asia Minor, rising N. W. of Mt. Ida, and emptying into the Propontis after a N. E. course of 50 or 60 m. It is famous as the scene of the first decisive victory of Alexander the Great over the army of Darius, 334 B. C.

GRANIER, ADOLPHE, usually called Granier de Cassagnac, a French journalist and historian,

born in Cassagnac in 1805. In 1832 he went to Paris, where he soon became a follower of the romantic school, and, on the recommendation of Victor Hugo, a writer for the *Journal des débats*. Having fallen out with Bertin on account of the pungency of his criticisms, he was engaged by Girardin for the *Presse* (1835), in which he wrote his famous articles against Racine, and rendered such important services to the administration of Molé that he was rewarded with a seat in the council of state. In 1840 he went to the Antilles, where he attracted the hatred of the colored population by his advocacy of slavery, and was elected a deputy, but the colonial council nullified his election. On his return to Paris he became a contributor to the *Globe*, and when this journal was discontinued in 1845, he established the ultra-conservative *Époque*, which was likewise discontinued after an existence of barely two years. When editor-in-chief of the *Époque*, he was accused in the chamber of deputies of having made a dishonest use of his influence with the government. After the outbreak of the revolution of Feb. 1848, he left Paris. He returned in 1850 and established the *Pouvoir*, which was soon discontinued. He wrote then in the *Constitutionnel* violent articles against the republic, but having in a series of articles against Belgium compromised the president by reporting expressions which he maintained he had heard from Louis Napoleon's own mouth, he was dismissed from the staff of that journal. In 1857 he established a new paper, *Le réveil*, to combat liberal ideas in state and church. He also contributed again to the *Constitutionnel*. In 1852 and 1857 he was elected a member of the legislative body. The most important of his works are: *Histoire des classes ouvrières et des classes bourgeoises* (Paris, 1837); *Histoire des classes nobles et des classes anoblies* (1840); *Voyage aux Antilles Françaises* (2 vols., 1842); *La reîne des prairies* (1845), in the collection of *Mille et un romans*; *Histoire des causes de la révolution Française* (4 vols., 1850); *Histoire du directoire* (4 vols., 1851); *Histoire de la chute du roi Louis Philippe* (2 vols., 1857).

GRANITE, in its common signification, a rock of granular, crystalline structure, composed of distinct particles of feldspar, quartz, and mica, promiscuously intermixed. The occurrence of these ingredients in grains is supposed to have given the name to the rock; some, however, trace it to the term *geranites*, applied by Pliny to a certain kind of rock. Granite is also used in a wider signification to designate a group of rocks, into the several varieties of which it is observed to pass by gradual changes in its composition. Thus when hornblende is found in place of mica, the rock is not essentially changed in its character, though now it is known by the name of syenite, so called from Syene in upper Egypt, where it was early known and quarried. Hornblende and mica are both frequently found in the same variety of granite, which is then called syenitic. When the feldspar is in prominent

crystals the rock is called porphyritic. Protogine is a talcose granite, talc taking the place of mica. Graphic granite is composed of flesh colored or white feldspar, intermixed with thin and irregularly shaped laminae of quartz. A section across the ends of these laminae presents the appearance of written characters or hieroglyphics upon the feldspar ground. Eurite is a granite deficient in mica. In its more general signification, granite is made to include all the unstratified or igneous rocks, excepting the lavas and traps. Lyell, indeed, arranges the latter with them under the general term Plutonic rocks. Murchison makes 3 divisions, volcanic, trappean, and granitic. The granites are distinguished from the traps by this remarkable peculiarity: they are never found overlying the stratified rocks, as trap is often seen to do, evidently having flowed over their surface like lava; yet several instances are cited of contiguous masses of these two rocks blending imperceptibly into each other; and granite is proved to be of the same igneous nature with the trap rocks from the similar changes induced on other formations, which are penetrated by dikes and intrusive masses of one or the other. These and other phenomena exhibited by the granitic rocks have led to the opinion now generally entertained, that they have been melted at great depth in the interior of the earth and under immense pressure; thus they received their crystalline structure, and that compactness so different from the porous nature of the lavas, or of the slag obtained by melting the granite itself. The granitic and volcanic rocks differ but little in their ingredients. Silica, alumina, lime, magnesia, soda, potash, and oxide of iron, differently combined and under different circumstances of pressure, &c., may make a porous lava, a compact trap, or a crystalline granite. Gneiss, a rock of the metamorphic group, classed with the micaceous slates, into which it passes, contains the same minerals as granite, but arranged in layers, giving a laminated structure to the rock. This arrangement is sometimes so obscure that the metamorphic cannot be distinguished from the igneous rock; and thus the granitic are linked through the metamorphic with the sedimentary strata, and may even be considered of the same nature with the former, the metamorphosis being more fully carried out. Granite is found constituting mountain masses, upon the flanks of which the stratified rocks are arranged in inclined layers, as if the granite had been protruded through them, lifting and pushing them back. It seldom reaches, however, the highest summits. It forms the flanks of a considerable portion of the Andes; but Humboldt states that one might travel for years through the mountainous districts of Peru without suspecting its existence beneath the micaceous schists and stratified rocks, or the porphyry, basalt, and volcanic matter, which cover this region. The elevated ridges of the Himalaya range are believed to be covered with stratified rocks. Mont Blanc presents the highest known

peak of granite. The rock lies in vertical beds, and the stratified formations adjoining it are in the same position, or else point toward the principal peaks. A remarkable feature in the granite, and in the scenery of this region, is the shooting upward of the rock into tall spires or *aiguilles*. One of these, called *Aiguille de Dru*, stands almost isolated, rising to the height of 11,000 feet above the sea, the upper 4,000 feet being a single, tapering, and perfectly inaccessible spire of granite. The rock is also met with in veins and dikes extending into other formations, sometimes granite itself, which in this case must have been previously solidified. Veins of granite again are observed to be cut by other veins of still later date. As granite is never found to cover other formations, it was formerly called primary, from its supposed earlier production than that of other rocks; and until very recently it was believed to be a universal formation, underlying at some depth all the others. It is now referred to no particular geological epoch, for it has been protruded through rocks of all periods, in the Swiss Alps converting even strata of the oolitic, cretaceous, and eocene formations into granular marble, gneiss, and metamorphic schists; and in the interior of the earth it is still probably in process of formation by the melting of other rocks of the same elements.—True granite is found in masses of great solidity unbroken by seams, and of remarkably uniform structure. It is seen upon the sides of some mountains covering acres of surface with hardly a crack or seam. Humboldt noticed it of this character upon the plains of the Rio Negro and the Amazon. But however massive and unbroken it appears, it exhibits when quarried a tendency to divide more easily in some directions than in others, and is found to be really traversed by parallel seams, which separate it into blocks more or less symmetrical. Being a rock of great durability, hard and compact, so much so that the finer varieties are susceptible of a good polish, and when carved retain better than any other rock used for architectural purposes the sharp edges of mouldings, granite has always occupied the first rank among building stones. Its great strength to resist pressure is exhibited in the trial of the Aberdeen granite used in the construction of the piers in the vaults of the London custom house. A half inch cube of the best stone required to crush it the pressure of 24,556 lbs. It is, moreover, easily split in large blocks by a very simple process. With a hand drill and hammer a workman bores a succession of holes from 3½ to 6 inches in depth, and 2 to 6 inches apart, along the line where he wishes to open the stone. The depth and number of the holes are proportioned to the size of the block. Into each of the round holes thus made he introduces two slips of iron called half-rounds, buckings, or feathers, being of wedge form, but round on one side and running to a point. He then inserts a small steel wedge between the flat faces of the two half-rounds and gently tightens it with the

hammer. This being done, he moves along the line tapping each wedge in order, and repeating the process till the strain causes a crack, which gradually opens, separating the block. Good granite of close grain and uniform texture should in this way make a clean separation, the crack going straight through twice or three times the depth of the holes. It may even be quarried out of the solid ledge in the same manner, provided there are natural seams; and where practicable the process is much to be preferred to blasting, which wastes the stone, breaking it into irregular shaped fragments. The latter is, however, a necessary operation in quarrying, in order to expose suitable faces for splitting, and to open seams. Blocks of great size may be obtained from good quarries, much larger indeed than there is any demand for. They are often split out from 40 to 80 feet in length, and are afterward reduced to smaller sizes. They are sold in the rough blocks commonly by the ton of 14 cubic feet, or if dressed, by the superficial foot of hammered surface. The quarries along the coast of Maine are noted for the excellence of their stone. They are most conveniently situated for its shipment, and immense quantities are sent from them to southern cities.—All New England abounds in granite. The most celebrated quarries are at Quincy, Mass., where the rock is, however, properly a syenite, hornblende being found in place of mica. This stone is well known in the public buildings of the cities along the Atlantic coast, the gulf of Mexico, and in the West India islands. Quarries of granite are worked in the highlands on the Hudson river, and also on Delaware bay. The granite of Staten island, which has been largely used in New York city for paving, is remarkable for its extreme density, a cubic foot of it weighing over 180 lbs., while that of Quincy is about 165 lbs. This difference would give the Staten island rock a decided advantage in the construction of submarine works like breakwaters, requiring great stability. Granite may be traced along the eastern spurs of the Appalachian range through the southern states. The formation is finely developed through South Carolina and upper Georgia. At Abbeville, S. C., the rock can hardly be distinguished from the Quincy granite. The Georgia railroad, through De Kalb co., passes over a solid floor of it, and in sight of the famous Stone mountain, a bare mass of granite rising perhaps 400 or 500 feet above the surrounding country, so steeply that only in one place can it be ascended. Much of the granite of the South, however, is in a singular state of decomposition. Seen in the railroad cuts or mining excavations, even those reaching to great depths, it has the appearance of a solid rock, but is as easily penetrated with a pick as is a bed of clay. The feldspar and the mica have decayed from some cause, but the grains of quartz retain their soundness and their place in the other materials. The granite of some parts of California, and of Auvergne in central France, appears to be similarly decom-

posed. Dolomieu called this the *maladie du granite*, and ascribed it to evolution of carbonic acid gas from the interior. The decomposition exhibited in the granite of the South has been conjecturally referred for its cause to sulphurous acid vapors, supposed to be produced by decomposition of the pyritous ores which it often contains. The action of water and air may be sufficient to remove the potash of the feldspar, and thus cause the rock to disintegrate. The best granite is injured by containing iron pyrites; this mineral is subject to decompose and leave a reddish brown stain of oxide of iron upon the stone. The manner in which the stone has withstood atmospheric agencies on the exposed surfaces of its natural beds is a good index of the durability of the same stone when worked. Granite generally derives its color from the feldspar, though the mica, when it is abundant and black, gives to the rock a dark shade. But feldspar is both the predominating ingredient and the most marked in its colors. It is white, flesh, or rose colored, and sometimes greenish; and granite often contains two kinds of it, the potash and soda feldspar, the one in large flesh-colored or white crystals, and the other in smaller crystals of a dead white. Quartz is the next most abundant ingredient, but together with mica it seldom forms one half the material. Some varieties of granite produce by the decomposition of the feldspar the kaolin used in the manufacture of porcelain; the quartz is separated as the clay is worked away, and remains in the form of sand. Such is the origin of most of the great deposits of silicious sands. Granite is a repository of veins of metallic ores. These are commonly found most productive, however, near its line of contact with other formations. Numerous interesting crystals of various minerals and gems are found in it, and in the veins which traverse it.

GRANT, a word constantly used in deeds of conveyance, and which once had a specific meaning, that now is almost lost. By the rules of the early common law all estates of land of which actual delivery could be made, could be transferred only "by livery (delivery) of seisin (possession);" that is, by open and actual or symbolic (a key for a house, a sword for a field, &c.) transfer of possession from the one party to the other. But there were valuable interests which could not be transferred in this way, as rents, estates in expectancy, reversions and remainders, and generally all mere rights and all incorporeal hereditaments. These could be transferred only by deeds containing the proper words of transfer. Of these, one of the principal was *concedo*, translated by "grant;" and all things which could be transferred only in this way were said "to lie in grant," while all of the first named class of interests and estates were said "to lie in livery." With *concedo* (grant), *do* (give) was always used; and these two words, "give and grant," were said to be the appropriate and peculiar words of grant. This distinction between livery and

grant was once very important; but it is now little more than a part of the obsolete learning of the law. In all deeds of land, or of any interest in land, corporeal or incorporeal, it is customary to say "give and grant." In the state of New York the peculiar meaning and force of the word may be regarded as abrogated by statute; for all deeds of bargain and sale, of lease and release, and all conveyances of the freehold, are declared to be grants. The same broad construction is given to the word by the practice of conveyancers and of courts in Massachusetts, Maine, and New Hampshire, and it would probably be found to prevail generally for all practical purposes.

GRANT. I. A N. co. of Ky., drained by Eagle river, an affluent of the Kentucky; area, about 200 sq. m.; pop. in 1850, 6,581, of whom 582 were slaves. It occupies a part of the Dry Ridge, which separates the waters of the Licking from those of the Kentucky. The surface is undulating and well timbered, and the soil is fertile. The productions in 1850 were 542,955 bushels of Indian corn, 18,415 of wheat, 29,648 of oats, and 104,808 lbs. of tobacco. There were 10 flour and grist mills, 5 saw mills, 17 churches, and 450 pupils attending public schools. Value of real estate in 1855, \$1,578,205. Organized in 1820, and named in honor of Col. John Grant, one of the early settlers of the state. Capital, Williamstown. II. A central co. of Ind., drained by Mississinewa river; area, 420 sq. m.; pop. in 1850, 11,092. It has a level surface and an excellent soil, adapted to grain, grass, and fruit. The productions in 1850 were 861,318 bushels of Indian corn, 90,961 of wheat, 40,868 of oats, and 22,842 lbs. of wool. There were 11 corn and flour mills, 18 saw mills, 4 tanneries, 1 newspaper office, 17 churches, and 1,250 pupils attending public schools. Organized in 1831, and named in honor of Moses Grant, who was killed in an Indian battle in 1789. Capital, Marion. III. A S. W. co. of Wis., separated from Iowa on the W. and S. W. by the Mississippi river, bounded N. and N. W. by the Wisconsin, and S. by Illinois; area, 1,080 sq. m.; pop. in 1855, 23,175. The surface is diversified by valleys, ridges, prairies, and woodlands; the soil, watered by Platte, Grant, Blue, and other rivers, is fertile and well adapted to wheat. Lead and zinc are abundant, and the former metal is found throughout the S. part of the county, which is said to produce upward of 6,000,000 lbs. a year. The agricultural productions in 1850 were 200,585 bushels of Indian corn, 127,164 of wheat, 204,666 of oats, 46,299 of potatoes, 118,946 lbs. of butter, and 8,884 tons of hay. There were 5 corn and flour mills, 12 saw mills, 1 newspaper office, 14 churches, and 4,174 pupils attending public schools. Organized in 1836. The Mississippi and Milwaukee railroad crosses the N. part of the county. Value of real and personal estate in 1855, \$3,772,741. Capital, Lancaster.

GRANT, ANN, better known as Mrs. Grant of Laggan, a Scottish authoress, born in Glas-

gow, Feb. 21, 1755, died in Edinburgh, Nov. 7, 1838. Her father, Duncan McVicar, an officer in the British army, having been ordered to America in her infancy, she spent 10 years of her life in the interior of New York. Her opportunities for instruction were not numerous, but she had the good fortune to come under the notice of Madame Schuyler, the widow of Col. Philip Schuyler, to whom she subsequently acknowledged that she owed "whatever of culture her mind received." The family returned to Scotland in 1768, and was impoverished at the commencement of the revolution by the confiscation of Mr. McVicar's estates in Vermont. In 1779 she was married to the Rev. James Grant of Laggan, Invernesshire. His death in 1801, in impoverished circumstances, obliged her to rely entirely upon her pen for subsistence. She had previously, in fugitive poems and in her correspondence, given evidence of considerable literary ability, and upon the publication of her collected poems in 1808 she was at once recognized as an elegant writer. She next published "Letters from the Mountains" (London, 3 vols. 12mo., 1807), abounding in fresh descriptions of highland scenery, character, and legends, and which gained her the friendship of some of the most distinguished men of the day. Her "Memoirs of an American Lady" (2 vols. 8vo., 1808; New York, 1809) gives a pleasant picture of her own childhood and of colonial life in America. Her remaining works are: "Essays on the Superstitions of the Highlanders of Scotland" (3 vols. 12mo., 1811), and "Eighteen Hundred and Thirteen, a Poem" (8vo., 1814). In 1844 appeared the "Memoir and Correspondence of Mrs. Grant of Laggan" (3 vols. 8vo.), a portion of the memoir being an autobiography, continued and edited by her son. Toward the close of her life she received a pension of £100 from government, upon the application of Scott, Jeffrey, Mackenzie, and others. Subsequent to 1810 she resided in Edinburgh, and her latter years were cheered by the affectionate regard of a large circle of friends, to whom her remarkable conversational powers and moral worth greatly endeared her.

GRANT, FRANÇOIS, R.A., a British portrait painter, born in Kilgraston, Perthshire, about 1800. He is the son of a Scotch laird, and early in life dissipated a handsome patrimony on horses and pictures. He next turned to account his taste for painting, and possessing executive facility and many aristocratic connections, he has gained an extended reputation as a fashionable portrait painter. Half the rank and fashion of the British metropolis have sat to him, and he has painted most of the political and military celebrities of the day. At the commencement of his career his favorite subjects were sporting compositions, embracing portraits of horses and dogs as well as men, and which, under the name of "The Melton Hunt," "Meet of the Queen's Stag Hounds," &c., have been widely disseminated through engravings.

GRANT, JAMES. I. A British journalist, born in Scotland in 1806. He is the author of several volumes of sketches prepared during the intervals of his labors on the daily press. Among these are: "Random Recollections of the House of Commons" (London, 8vo., 1836), "The Bench and the Bar" (2 vols. 8vo., 1837), and "The Metropolitan Pulpit" (2 vols. 8vo., 1839). For several years past he has been the editor of the London "Morning Advertiser." II. A Scottish novelist, born in Edinburgh, Aug. 1, 1822. His father was an officer in the British army, and his own education was mostly received in barracks in British North America. After serving for a short time in the 62d regiment as ensign, he resigned his commission, and has since devoted himself to literature. He has been a voluminous writer of military and historical romances, some of which have had a very extensive circulation in a cheap form. His chief publications are: "The Romance of War, or Highlanders in Spain" and "in Belgium" (4 vols., 1846-'7); "Adventures of an Aide-de-Camp" (8 vols., 1848); "Memoirs of Kirkaldy of Grange" (1849); "Walter Fenton, or the Scottish Cavalier" (3 vols., 1850); "Bothwell, or the Days of Mary, Queen of Scots" (3 vols., 1851), &c. He is also a frequent contributor to the "Dublin University Magazine."

GRANT, ROBERT EDMUND, a Scottish comparative anatomist and zoologist, born in Edinburgh, Nov. 11, 1798. He was distinguished in his youth for his devotion to anatomical and physiological studies, and before the age of 21 had become president of the medico-surgical and royal medical societies of Edinburgh. After a series of long visits to the chief university cities of the continent, he established himself in Edinburgh, where he lectured on comparative anatomy, and became a frequent contributor to the scientific journals. His series of papers "On the Structure and Functions of the Sponge" were very highly esteemed. In 1827 he accepted the professorship of comparative anatomy and zoology in the London university, now known as University college, which he continues to hold. He has published many scientific papers, and in 1835 commenced a great work entitled "Outlines of Comparative Anatomy, presenting a Sketch of the Present State of Knowledge and of the Progress of Discovery in that Science, designed to serve as an Introduction to Animal Physiology and to the Principles of Classification in Zoology," which is not yet completed.

GRANVELLE, ANTOINE PERRENOT, cardinal de, a Spanish statesman, born in Besançon, Aug. 20, 1517, died in Madrid, Sept. 21, 1586. He was the son of Nicolas Perrenot, a man of obscure birth, but long the chancellor and favorite minister of the emperor Charles V. He was educated at the universities of Padua and Louvain, where he acquired a profound knowledge of civil and ecclesiastical law, an acquaintance with 7 languages, and a classical elegance in

speech and writing. These brilliant attainments, added to a pleasing demeanor and his father's high position, pointed him out for distinction, and having received orders, he became canon of Liège cathedral at the age of 23, and was nominated at the same time to the bishopric of Arras, though the laws of the church did not allow his consecration before the age of 25. He accompanied his father to the diets of Worms and Ratisbon, and in 1543 attended the council of Trent, where he supported the emperor's project of a war with France with so much eloquence that Charles appointed him councillor of state. The young bishop repaid this distinction with untiring zeal in his sovereign's service. Despotism, ambitious, of prodigious industry, and endowed with a comprehensive intellect which enabled him to manage vast and complicated interests with perfect ease, he was not long in recommending himself to Charles as the fittest person to hold those offices from which old age must soon compel the elder Perrenot to retire. He was appointed to draw up the treaty of peace with the Protestants after the battle of Mühlberg, and is said on that occasion to have treacherously imprisoned the landgrave of Hesse, who had been promised his liberty. He managed the capture of Constance from the Protestants, succeeded his father as keeper of the great seal in 1550, and accompanied the emperor on his flight from Innsbruck in 1552, riding armed cap-à-pie by the side of the royal litter. Soon after this he had the chagrin of witnessing the conclusion of the treaty of Passau, which guaranteed a religious toleration utterly foreign to his principles, and overturned the plans upon which Charles had bestowed years of labor. On the emperor's abdication of the sovereignty of the Netherlands in favor of his son Philip II. (1555), the young king, unable to address his assembled subjects either in French or Flemish, employed Granvelle to speak for him. In accordance with his father's counsel as well as his own inclination, Philip retained the minister in office, and admitted him to his closest confidence. It was by his advice that the bloody decree of 1550 against the reformed religion was reenacted in 1556, but it excited such indignation that it could not be enforced. In 1559 the minister succeeded in renewing by the treaty of Cateau Cambrésis the peace between France and Spain, which had been broken by Henry II. Soon afterward Philip departed from the Netherlands, intrusting the regency of that country to his half-sister Margaret of Parma, and appointing Granvelle one of her supreme council. The bishop was also one of the 8 ministers who composed the *consulta*, a select body with whom the regent was to advise in all the more important matters of state. The other 2 were his warm friends; and the regent was instructed to defer greatly to his opinion, so that Granvelle was the real governing power in the Netherlands. It was not long before he became universally detested. The nobles eyed him with jealousy, while his arbitrary measures, his reli-



gious intolerance, and his contempt for "that mischievous animal the people," as he called the mass of the Netherlanders, stirred up against him in the lower ranks a hatred such as few ministers have ever incurred. A ground of loud complaint was the erection of 14 new sees, without the consent of the states-general. They were to be supported, in accordance with a plan devised by Granvelle, by suppressing the offices of the abbots, and transferring the revenues of their houses to the bishops. The archbishopric of Mechlin, with the rank of primate, was conferred upon the minister. The people saw in these measures a preparation for establishing the inquisition, and Granvelle, upon whom, perhaps unjustly, the whole blame was laid, was received on his entry into Mechlin with significant silence. In Feb. 1561, he was created cardinal, and was thereafter more commonly known by the surname of Granvelle, which he derived from an estate purchased by his father. The new dignity had been procured for him by the regent, but he would not accept it until he had obtained permission of Philip, whom he used to call "the master." Devotion to the master was in fact the rule of his life. Though he averred with some show of reason that the new bishoprics conflicted with his personal interests, he was unflagging in zeal for their support; and whether from identity of principles, a courtier-like deference, or his faculty of leading his superiors while he seemed to follow them, he was never known to oppose the royal will. His influence on Philip was of the worst character. He anticipated the complaints of the Netherlanders and suggested the king's replies. If overruled, as he sometimes was, in the regent's council, he would transfer the whole matter to Madrid, where he was sure of victory. He aggravated rather than allayed Philip's suicidal severity toward the Protestants. He complained of the authorities for lukewarmness in persecuting. He ordered 2 heretics to be burned at Valenciennes; they were rescued; a riot took place; a fearful number of executions followed, and a torrent of popular hatred fell upon the minister. He was ridiculed and abused in street farces, caricatures, lampoons, and epigrams. Popular clubs called "rhetoric chambers" devoted themselves to the manufacture of these satirical compositions; and among the endless doggerels which were posted on the street corners and passed from hand to hand, there were not wanting verses whose caustic wit the cardinal felt deeply. He had quarrelled with Egmont and Horn, and William of Orange was too honest a hater of the Spanish despotism to remain long on the intimate terms with him on which he had been at first. Granvelle soon perceived that William was the leading spirit of the opposition, and thenceforth lost no opportunity to intrigue against him. With the king and regent he now plotted to sow discord among the nobles by apportioning greater rewards to some than to others. He filled the king's ear with injurious reports about them, and represented a few dis-

contented nobles as driving the whole nation to revolt. Meanwhile he enjoyed the unlimited confidence of Margaret and "the master," and in his villa near Brussels, surrounded with pomp and luxury, he looked down with philosophic contempt upon the machinations of his enemies. In 1563 Egmont invented a livery for his retainers, which bore upon the sleeve a device resembling a head, wearing a red fool's cap or a monk's cowl. It was at once recognized as an allusion to the cardinal, and the "fool's cap livery" became the badge of party. Before this, however, the governors of the provinces, the knights of the golden fleece, and most of the aristocracy, unable longer to endure the minister's arrogance and despotism, formed a league, bound themselves to one another by an oath of secrecy, and petitioned for Granvelle's removal. Their letter was signed by William of Orange, Egmont, and Horn, who at the same time resigned their seats in the council. Philip's reply was brief. He refused to grant their demand or accept their resignations. They would not resume their seats, however, and drew up a second letter to the king and a remonstrance to the regent. Alarmed by the determined stand of the league, and weary of Granvelle's rule, Margaret began to waver, and at last wrote to Philip recommending the obnoxious minister's dismissal. After a delay of several months Granvelle received the monarch's command to "leave the Low Countries for a few days and go to Burgundy to see his mother" (March, 1564). The news spread like wildfire, and the whole country was a scene of rejoicing. The cardinal, who bore his reverses with intrepidity, took his departure in great state on March 18, and retired to Besançon, where he passed his time in the study of literature and the physical sciences. He was still consulted however by Philip, and was thought to have no mean share in directing the affairs of Flanders. In 1565 he went to Rome by the king's order, and very much against his own will, and there participated in the election of Pope Paul V. In 1570 he was employed to negotiate the alliance between Spain, Rome, and Venice against the Turks. He was afterward appointed viceroy of Naples, and in 1575 was recalled to Madrid, where Philip made him president of the supreme council of Italy and Castile. This gave him the power though not the name of prime minister. He negotiated the terms of union between Spain and Portugal, and when Philip went to take possession of his new kingdom Granvelle acted as regent during his absence. The marriage contract between the infanta Catharine and the duke of Savoy was effected by his management, and is regarded as one of his most brilliant achievements in diplomacy. In 1584 he resigned the archbishopric of Mechlin to accept the less opulent see of Besançon.—Granvelle was a liberal patron of letters. He enriched the college of Besançon, founded by his father, and contributed largely to the support of the printing establishment of the celebrated Plantin at Antwerp. He

was covetous, but munificent, and if, as Margaret wrote after his disgrace to the king, he made abundant use of his opportunities for population in the Netherlands, much of his wealth was well bestowed upon the public. He used to preserve the enormous correspondence which reached him, and 80 years after his death such of these valuable papers as had not been destroyed through the ignorance of his heirs were rescued from oblivion and assorted by the abbé Boissot, superior of a Benedictine monastery at Besançon. The abbé bequeathed them to his monastery, and in 1834 a commission of 5 scholars, with M. Weiss at its head, was appointed at the instance of M. Guizot to prepare portions of them for publication at the cost of the French government. The first volume appeared in 1841, and 9 vols. 4to. had been issued in 1864. Beside the cardinal's letters, they comprise a great number of state papers, official documents, and letters of foreign ministers, and of Charles V. and Philip.

GRANVILLE, a N. co. of N. Carolina, bordering on Virginia, and intersected by Tar river; area, about 750 sq. m.; pop. in 1850, 21,249, of whom 9,865 were slaves. The surface is slightly hilly, and the soil generally good. The productions in 1850 were 551,865 bushels of Indian corn, 3,420,884 lbs. of tobacco (the greatest quantity produced in any county of the state), and 76 bales of cotton. There were 14 corn and flour mills, 5 saw mills, 1 newspaper office, 26 churches, and 1,535 pupils attending public schools. Value of real estate in 1857, \$2,204,833. The county is traversed by the Raleigh and Gaston railroad. It was organized in 1746, and named in honor of its proprietor, Earl Granville. Capital, Oxford.

GRANVILLE (anc. *Grannonum*), a seaport of France, department of Manche, on the English channel, at the mouth of the Bosq; pop. in 1856, 13,568. It has a small harbor with a fine granite pier capable of mounting cannon, is built in terraces formed on the side of a promontory, is surrounded with walls, and has a fort on the summit of the promontory. The industry of the inhabitants is connected with shipping.

GRANVILLE, GEORGE, Baron Lansdowne, an English author and statesman, born in 1667, died Jan. 30, 1735. He entered Trinity college, Cambridge, at the age of 10, and 8 years later received the degree of M.A. About the same time he began to write poetry, and on the accession of James II. addressed several pieces of verse to him. During the duke of Monmouth's rebellion he was desirous of taking the field in behalf of the king, but was persuaded by his father to refrain. When the prince of Orange projected his expedition to England, he was again anxious to prove his loyalty, and upon being again refused by his father, he addressed to the latter a letter of remonstrance which is commended by Dr. Johnson and others for its vigor and eloquence. During the reign of William and Mary he lived in retirement and wrote several plays, one of which, "Heroic Love," is

highly praised in a passage of Dryden. Becoming by the death of his father and elder brother the head of the influential family of Granville, he entered parliament in 1710, and in the same year was appointed secretary of war in place of Walpole. In Jan. 1712, he was created Baron Lansdowne of Biddeford. Upon the queen's death he lost his offices, and, on account of his avowed sympathy for the pretender and his participation in the scheme for raising an insurrection in the west of England, was committed to the tower in Sept. 1715, where he was confined until Feb. 8, 1717. Being suspected again in 1722 of some connection with the Atterbury plot, he retired to France, and returning to England in 1733 published an edition of his works in prose and poetry in 2 vols. 4to.

GRANVILLE, GRANVILLE GEORGE LEVESON GOWER, 2d earl, a British statesman, born in London, May 11, 1815. He was educated at Eton and Oxford, and entered public life in 1835 as attaché to the British embassy at Paris, of which his father, the 1st Earl Granville, a well known diplomatist, was the head. In 1836 he was returned to parliament for the borough of Morpeth, subsequently became under secretary of state for foreign affairs, and sat for Lichfield from Sept. 1841, to Jan. 1846, when he succeeded to his title. He held the seals of the foreign office in the Russell cabinet from Dec. 1851, to Feb. 1852, and was lord president of the council from Dec. 1852, to June, 1854, and again from Feb. 1855, to Feb. 1858. In 1856 he was present at Moscow as the British ambassador extraordinary at the coronation of Alexander II. Upon the formation of the Palmerston-Russell ministry in June, 1859, he resumed his former post as president of the council.

GRAPE the fruit of a well known tree-like vine (*vitis vinifera*, Linn.), a native of Greece, Asia Minor, and Persia, and in its almost endless varieties cultivated for the table and for the manufacture of wine. Other species, indigenous to North America, are esteemed for wine, as the *V. labrusca*, &c.; but the coarse pulp, large seeds, and thick, tough, astringent skin of the berries render the fruit unpalatable. The outdoor cultivation of the grape is carried to a greater extent and perfection in foreign countries, although considerable vineyards of those kinds suited to our climate are to be found in different parts of the United States. For indoor culture, both in forcing houses and under glass without artificial heat, the vine has proved of great consequence, and has afforded abundant crops of perfectly ripened and delicious fruit. The severely cold winters of New England, and the alternations of heat and cold in districts where the severity of the atmosphere is not so great, make some protection necessary for the vine. Even so far north as Boston some varieties of the *vitis vinifera* will ripen in ordinary summers if trained upon protected and sunny walls, and if the vines be covered from the frosts during the winter. It has been found that many of the better sorts can be treated so as to secure very

good crops, if the vines are trained within what are technically called cold houses, being span-roofed glass structures, without flues for fire heat. Even under the sashes of the ordinary greenhouse fine varieties are frequently raised, the only precaution, after ripening the fruit, being to allow sufficient air from without to mature the wood. When this has been effected, the vines are properly pruned and withdrawn from the house, and are buried just outside under the soil, or suitably covered from the atmosphere. The best modes for building structures for cultivating the different kinds of grapes will be found in special treatises on the subject. In forcing the vine, constant heat of a high temperature is to be maintained day and night, and great care is necessary in the proper regulation of moisture. By such methods the fruit can be produced in high perfection many months before the usual season; and when vegetation is in full vigor in the open air, the vines are in a state of repose. By a succession of experiments from year to year, this repose, so essential to their health, can be made to take place at whatever period of the year the cultivator may choose; and thus a system of retarding may be instituted, by which the fruit can be produced whenever needed. By using the shortest possible limits for the repose of the vines, and thence forcing them into a new growth, a number of crops may be obtained in a few months; but the process is so unnatural and exhausting that nothing but motives of curiosity in the experiment would seem to warrant it. The vine is dependent for its vigor and productive powers upon plenty of nourishment; and accordingly the border in which the roots are planted is made especially rich and nutritious, by combining various substances, such as rich old manure, leaf mould, bones, &c. Almost every cultivator has his own ideas as to what is most suitable; and the practical treatises on the subject suggest many plans. For ordinary cultivation, affording, all things considered, the best and surest crops, may be mentioned the variety known as the black Hamburg, and several sub-varieties of this, such as the red and the white Hamburg, &c.; the Chasselas varieties, the white Frontignan, the grizzly Frontignan, muscat of Alexandria, red Traminer, &c. The early black July and the Pitmaston, if planted in the warmest situations of the house, will precede the black Hamburg. The number of foreign grapes in the London horticultural society's catalogues for 1842 amounts to 94 distinct kinds, with numerous synonymes. Mention has been already made of other species than the true wine-producing grapes, such as those of North America, represented in *V. labrusca*, *V. vulpina*, *V. astivalis*, &c. Of these, many distinct varieties are to be met with in our woods, and are well known, the seeds of the actual species oftentimes spontaneously producing numerous sorts of a new or peculiar character. The number of species, according to Torrey and Gray ("Flora of North America,"

vol. i. p. 244), is 5 or 6; although Rafinesque, by an examination and classification of these indigenous varieties, as it would seem, has enumerated as many as 41. Prince in his catalogue gives about 100 varieties. It would probably prove a most difficult task to reduce such proteiform conditions to any correct classification, the foliage, the size of the flowers, or the color of the fruit affording but slight means of discrimination. Very marked differences are noticeable, in the woods of Massachusetts, between accidental varieties of the fox grape (*V. labrusca*). To it is attributed the Isabella, said to have originated in South Carolina; but the oval form of the berries would seem to point to some other parentage, especially as seedlings from this variety have uniformly retained the peculiar shape of the berry. The Isabella is a universal favorite at the north; its fruit when perfectly ripe is good, and especially when ripened under glass it is deliciously sweet like honey or nectar. The Catawba, which according to Adlum is a native of Maryland, is well suited to the valley of the Hudson, requiring a long and warm season. An earlier variety is the Diana, a seedling from the Catawba, and by some considered superior. The two latter have globular, amber-colored berries, and a pleasant musky flavor, and may have been derived from the *V. riparia* (Mx.). The Concord is a variety with large, black, globular fruit, which points to the *V. labrusca* as its original. Nuttall and several others highly recommend the Bland, which properly belongs to southern culture. A variety of the fox grape with small branches, but very large globular berries of an amber red color, called the mammoth globe, has proved so early that it has been esteemed by some; and upon this as the maternal plant, impregnation by the sweet water and black Hamburg has been effected, and some promising seedling hybrids produced. The Isabella has also been impregnated with the black Hamburg and the Chasselas; and superior early sub-hybrids, excellently suited to the cold house especially, have been the result. Some wild grape from the woods, probably the *V. labrusca*, has been used for hybridization with the Catawba and Isabella among other experiments, and with much promise. Further trials of a similar character may eventually produce a race of grapes adapted to very general outdoor cultivation. As yet, in the more northerly states, some protection during the winter is advisable for the better kinds; and the most simple and sure is, after the autumnal pruning, to untie the vines from their trellises and lay them carefully upon the ground, covering them with earth. With the Isabella this is seldom done; in consequence, the crop is diminished and sometimes lost by the occasional severity of the winter. The American grapes, like the foreign, delight in rich soils; and borders in which the vines are planted should be properly prepared. Most of them are rapid and strong growers, extending many yards in a single summer, and ascending to

the tops of lofty trees when growing in the woods. Some cultivators of the wild sorts recommend the use of an otherwise worthless tree for their free and unpruned growth, finding the result to be a greater yield of fruit. The foliage under cultivation is frequently attacked by a cobwebby mildew in spots and blotches (*uncinula spiralis* and *botrytis viticola*, Berkley and Curtis), which sometimes nearly destroy it. The fruit is also greatly affected with a fungus (*erysiphe*), so completely investing the berries as to stop their further growth and arrest their ripening. A sulphur wash applied several times with a syringe will commonly cure the evil. The best mode of propagating choicer varieties is by a process termed layering. A branch of one year's growth is bent down and partially severed from the stem; it is covered with good soil just where the wound is made, when in a few months abundant roots will be found to have issued from the buried joints. Separated and planted out on the succeeding spring, a fine strong vine is procured.—See Nuttall's "Genera of North American Plants" (Philadelphia, 1816); Rafinesque's "Manual of Grape Vines" (Philadelphia, 1830); Loudon's "Encyclopædia of Gardening" (London, 1834); Hovey's "Magazine of Horticulture" &c. (Boston, 1835-'59); the "Horticulturist" (New York, 1846-'59); Torrey and Gray, "Flora of North America" (New York, 1838); Hoare "On the Vine" (London, 1840); "Proceedings of the Essex Institute," vol. i. p. 195 (Salem, Mass., 1856); Downing's "Fruits of America" (revised ed., New York, 1859).

GRAPE SHOT, formerly small shot put into a canvas bag, which was corded into cylindrical form to fit the piece of ordnance from which it was to be fired. This practice was superseded by the use of canister shot, in which the balls are confined in a canister of iron plate. The term grape shot is now applied to an assemblage of iron shot of sizes adapted to the bore of the piece, which are tied or quilted around a metallic spindle. The missile has the appearance of a bunch of grapes, thus suggesting the name. The shots fly asunder as they leave the gun, and prove very destructive to troops and rigging at short distances.

GRAPHITE (Gr. *γραφειν*, to write), the mineral commonly called black lead or plumbago, the composition of which is similar to that of anthracite, being in the pure specimens from 90 to 96 per cent. of carbon, with 4 to 9 per cent. of iron; some also contain silica and alumina in small quantities. A variety from Ceylon has been found to contain 98.55 per cent. of carbon. The substance is produced in the slags of furnaces in the process of reducing iron ores, as is seen in pig iron, especially when this has been made with large consumption of fuel. Its common name in this form is kish. The mineral, though met with in the igneous and metamorphic rocks, is considered, like the coals, of vegetable origin, representing a higher stage of metamorphism of the vegetable substance

analogous to that which takes place in the blast furnace. It is remarkable for its black and shining streak, resembling that produced by lead, whence its common name. The mineral is black or dark steel-gray, of laminated structure, of greasy feel, easily cut with a knife, and staining the fingers when handled. Its hardness is 1 to 2; specific gravity 2.09. It is met with in foliated or granular masses, constituting irregular beds, veins, and nests in granite and the metamorphic rocks. Though combustible at high temperatures, it is infusible, and powerfully resists the action of heat when mixed with clay; hence its use for crucibles. It derives its principal interest from its employment in making lead pencils; and the mine at Borrowdale, in Cumberland, England, has long been celebrated for producing an article superior to all others for this purpose. The mine has been known since the time of Queen Elizabeth; and as the use of lead pencils cannot be traced back so far as this period, it very likely furnished the material for the first of these ever made. It is in the mountain called Seatallor Fell, 8 m. S. of Keswick, the top of which is about 2,000 feet above the sea. The mineral occurs in small nests in trap, which is itself included in clay slate. The pieces are stated to be of about the size of the fist only. So valuable did this mine prove, that it became an object of plunder to almost all that could get access to it. It was reached underground from neighboring mines, and in one instance was forcibly taken possession of on the surface. An act of parliament was passed allowing the use of extraordinary means for its protection, and it was guarded by firearms. The mine is entered by an adit, the mouth of which is in a strong building containing 4 rooms on the ground floor. "In the innermost of the 4 rooms 2 men are seated at a large table sorting and dressing the plumbago, who are locked in while at work, and watched by the steward from an adjoining room, who is armed with 2 loaded blunderbusses. Such formidable apparatus of security," says Dr. Ure, "is deemed requisite to check the pilfering spirit of the Cumberland mountaineers." The plumbago was then so pure that it required little preparation for the market; and it was so easily obtained, that, not to overstock the market, and to prudently husband the supply, the mine was worked only for 6 weeks each summer. Formerly it was the custom to open the mine only once in 7 years. The product obtained in the 6 weeks' working has sometimes amounted to £80,000 and even £40,000 in value. The mine was closed by damming up a stream with several hundred cart loads of rubbish and causing it to flood the workings. The best graphite obtained here was so pure that it could be cut directly into slips for the best pencils. The supply of this, however, has now ceased, and no more of the same quality is obtained elsewhere. But fortunately a method has been devised of purifying the more gritty varieties, and condensing the fine powder into

blocks, from which slices are cut that are as good as those from the best original specimens. The powder when purified is first exhausted of the air diffused through it, and is then subjected to great pressure. The sawed slices are laid in a little channel grooved in a rectangular piece of cedar, and are then covered with a thinner slip which is glued upon the larger one. The square slip is next passed through a machine, which gives it the cylindrical form of the pencil. The cylindrical leads for ever-pointed pencils are also first cut in square prisms, and are made round by passing them through a succession of holes cut in rubies; the first makes the prism 8-sided, the second 16-sided, and the third cylindrical. The rubies are rapidly worn out by this process, and steel is said to last but a few hours. The cheap leads are consequently made of a softer composition than the genuine Cumberland article. A method of manufacture was introduced into France by M. Conté, by which pencils have been made of various degrees of hardness by intermixing with the powdered and calcined graphite pure clay reduced to the finest and softest consistency, and also different colored earths. The mixed paste is thoroughly triturated with water on a porphyry slab, and is then pressed into moulds in wood, by which it receives the form of elongated strips. These are dried in the moulds in an oven, and when taken out are placed in a crucible and baked at a heat proportioned to the hardness required. The mixture of the ingredients is made with reference to the same object. The hardest pencils have only half as much graphite powder as clay; softer ones have equal parts of each. The leads for pencils intended for the finest work, before being placed in the wood, are heated and then immersed in hot wax or suet. The hardest pencils, however, are made of an alloy of metallic lead, antimony, and mercury. Common pencils are made of graphite powder mixed with melted sulphur and run into moulds. Gum Arabic and resin are sometimes used as ingredients.—Pencils are manufactured in the United States from graphite obtained from several localities, but especially from Sturbridge, Mass. It is there found in a bed in gneiss, which is traced on the surface more than 100 rods, its width varying from an inch to 2 feet. The mine was worked as far back as 1840 to the extent of 80 tons of graphite annually. This is manufactured into pencils in Taunton, the mineral being pulverized and then by great pressure condensed into sheets, which are sawn into strips. Mines have also been worked at Brandon, Vt., Fishkill and Ticonderoga, N. Y., Wake, N. C., and St. John, N. B. The mineral is also found at many other localities. Beside its use for pencils, it is a valuable material for crucibles and portable furnaces. It is also employed for lubricating machinery, as a lining of moulds for delicate castings, for a stove polish, &c. The article is sometimes adulterated with lamp-black.

GRAPTOLITES (Gr. *γραφω*, to write, and

*λίθος*, a stone), a genus of fossil zoophytes, of as many as 20 species, found only in the silurian rocks, abounding particularly in the slates of the Hudson river group. So numerous are these early forms of zoophytes in the Llandeilo rocks of Europe, that it has even been thought probable that the carbonaceous character of the slates was owing to the abundance of their remains; and this even in those rocks in Dumfriesshire in which the carbonaceous matter is presented in beds of anthracite. As found in the black slates, their forms are obscurely retained, and the fossils may easily be mistaken for impressions of plants. They are long and slender, resembling some algæ, as well as the feather part of a quill, whence their name. When found in calcareous strata their forms are more distinct. Their nearest living analogues are the *rigularia* and *pennatula*, of which the species inhabit muddy sediment, such as the black slates must once have been.

GRASSE (anc. *Grassa*, *Grinnicum*), a town of France, capital of an arrondissement of the same name, in the department of Var, built in the form of an amphitheatre on the S. slope of a fine hill, 23 m. E. N. E. of Draguignan; pop. in 1856, 11,554. It has several churches, manufactories of leather, soap, olive oil, liquors, &c., and is famous for its distilleries of perfumery.

GRASSES, a very extensive order of plants, including all which produce corn, such as maize, barley, wheat, together with rice, sugar cane, &c. The grasses are endogens furnished with solid stalks (rhizomes), which generally creep just under or upon the surface of the ground, and hollow, cylindrical stems (the straw), that have transverse partitions or diaphragms at their joints or nodes, whence issue the leaves placed alternately, and terminated by variously modified spikes of small and not very attractive flowers. The floral leaves are called glumes, paleæ, and scales; the stamens are usually 3 in number, yet vary from one to 6 or more, having anthers curiously balanced upon the tops of the styles and termed versatile; the pistils are 2 or 3, furnished with feathery or hairy stigmas; the ovaries are simple, and the seed is composed of a membranous pericarp, usually undistinguishable, and filled within by a farinaceous albumen, at the base and on one side of which lies the embryo. Most of the grasses are perfectly harmless, although all are not nutritious, the darnel (*lolium temulentum*) of Europe and the pigeon (*festuca quadridentata*) of Quito being deleterious. The value of the grasses for fodder is hardly second to that of grain for human food. Usually the best fodder grasses are those that form a sod, which in the northern states consist of several distinct species, that succeeded each other in the time of flowering. One of the earliest is the vernal grass (*anthrum odoratum*), followed by the meadow grass (*poa pratensis*), the lesser quaking grass (*briza media*), the red top (*agrostis vulgaris*), and others. In a sod of grass cut from Selborne common, England, 6 distinct species of true

grasses were found, and this number is probably no greater than could be detected in the pasture lands of the northern United States. A cool climate, or one whose springs are cool and moist, is favorable to abundance of the grasses; and the turf of such regions contrasts singularly with the coarse, scattered, and tufted grass plants of dry and warmer climates. In the tropics this difference is still more marked, where may be seen species assuming the altitude of trees and growing from 50 to 60 feet high. The leaves of such grasses, too, are much broader, and resemble the leaves of other plants. The flowers are usually dioecious, such as may be found in *sorghum*, *sea*, *agilops*, &c. Usually their harder and coarser tissues afford slight nourishment as fodder.—The grasses have an almost universal geographical distribution. Some species occur under the equator, and others upon alpine heights. One of the few plants met with by Phipps at Spitzbergen was *agrostis algida*. None are found in the sea; some grow upon sea beaches, some in sand, some in fresh streams, and the greater part upon land. In like manner the cereal grains used in agriculture have a wide range, but dependent upon isothermal conditions. Considered with respect to this subject, the earth may be divided into 5 grand kingdoms, viz., those of rice, maize, wheat, rye, and barley and oats. Barley and rye mature in lat. 52° to 57° in Russian North America. Barley and oats extend furthest in the north of Europe, affording bread to the inhabitants of the northern part of Norway, Sweden, a part of Siberia, and Scotland. Where the vine flourishes in Europe and western Asia, rye becomes rare, and wheat is the general breadstuff. In India, Arabia, Egypt, Nubia, Barbary, and the Canary islands, rice, maize, and several kinds of durra (*sorghum*), with the *poa Abyssinica*, are cultivated; while rice is the chief cereal in China and Japan. It has been precisely ascertained that every cultivated plant requires a certain quantity of heat for its development; but the effect is the same whether the heat is distributed over a longer or shorter space of time, provided certain limits are not exceeded. Barley, for instance, will no longer ripen where the mean temperature sinks below 36.24°, or where it rises above 71.36°. Bous-singault was the first to observe that the conditions under which a plant flourishes are a certain quantity of heat and certain periodical limits in its actual growth. Wherever these can be maintained, species may be cultivated; and this widely diffused character of the cereal grasses establishes the fact.—The number of genera of the grasses, according to Endlicher, is 234, and of species about 3,000, of which perhaps 600 are American. They are usually arranged or classified under distinct tribes, with characters based upon the structural appearances of the flowers, such as the manner in which they are borne upon the flower spikes, the size, form, and length of the glumes, the presence or absence of awns, of pubescence, &c. But a small

proportion of the grasses are of utility to the farmer, while a great number are to him no better than weeds. No grass is superior to the herd's grass or timothy (*phleum pratense*) for general field culture to produce English hay, as it is termed; it is a foreign species, but excellently acclimated to the northern United States. It grows very readily, and yields large crops, instances being known where the yield to the acre was 4 tons of the best quality of hay, this species constituting the bulk of the grass. The proportion of grasses as compared with that of other plants varies in different districts; in New York it is about  $\frac{1}{3}$ , while in Wisconsin it is about  $\frac{1}{4}$ . Beside the value of the grasses in an economical point of view, many of them are highly ornamental, and some are so curious as to be admitted into the garden among the flowering plants.

GRASSHOPPER, a name properly applied to orthopterous insects of the family *gryllida*. The term is popularly given to insects of the allied family *locustada*, and the generic name *locusta* is by some entomologists in Europe unfortunately assigned to the grasshopper; the *sauterelles* of the French include both locusts and grasshoppers; great inconvenience has arisen from this confusion of names, which will be avoided by calling the grasshoppers *gryllida*, and the locusts *locustada*, with Harris and Westwood. The *gryllida* are characterized by having long antennae, 4 joints to all their feet, wing covers sloping downward at the sides of the body, and the end of the abdomen in the females provided with a projecting sword-shaped piercer; the jaws are formed for mastication; the upper wings are thick and opaque, overlapping a little on the back, this portion forming a long triangle, traversed in the males by strong projecting veins, between which are thin, transparent, membranous spaces; the under wings are thin and folded in plaits like a fan; they undergo a partial transformation, the larvæ and pupæ being active, voracious, and wingless; they are injurious to vegetation in all their forms. The males emit a shrill sound produced by the friction of the overlapping portions of the wings, intensified by the vibration of the air contained in the internal air sacs and its action upon a complicated series of valves and membranous plates about the origins of the wings and legs. Most grasshoppers are of a green color, more or less resembling the leaves of the plants upon which they feed; they are more active by night than by day, in which they differ from the locusts or diurnal grasshoppers; like the latter, when taken, they emit from the mouth a dark-colored fluid, known by every school boy as "molasses;" they do not associate together, nor migrate from place to place in large numbers, as do the locusts proper. Some live upon grass and herbaceous plants, and the females lay their eggs in the ground in holes made by their nearly straight piercers; the eggs are elongated, ellipsoidal, very numerous, from  $\frac{1}{4}$  to  $\frac{1}{2}$  of an inch long, and

covered with a thin varnish-like film. Others live upon trees and shrubs, like the katydid; their wings and covers are broader, and the females deposit their eggs on the branches of trees in regular rows, having shaved off the bark with their short and curved piercer. The legs are 3 pairs, the posterior being much the largest and capable of performing the jumps whence these insects derive their name; they all end in elastic hooks. The flight of the grasshopper is short and unsteady compared with that of the locusts, and comparatively noiseless. The American katydid (*platyphyllum concavum*, Harris) will be described under that title. Other native grasshoppers are: 1. The spotted wingless grasshopper (*phalangopsis maculata*, Harris), pale yellowish brown, with small light spots on the darker back, smooth and shining, with arched back, from  $\frac{1}{4}$  inch to about an inch long; it is common under stones and sticks in the woods, has the short thick body and stout hind thighs of a cricket, and is entirely destitute of wings. 2. The oblong leaf-winged grasshopper (*phylloptera oblongifolia*, De Geer) is of a brilliant green color, with very delicate wings, the under extending far beyond the upper; the body is only about an inch long, but to the end of the wings it often measures 3 inches; in its perfect state it is found upon trees in September and October; during flight it makes a whizzing noise. 3. The curved-tailed grasshopper (*P. curvicauda*, De Geer), of the middle and southern states, is a larger species, with wing covers broadest in the middle. 5. The narrow-leaved grasshopper (*phaneroptera angustifolia*, Harris) is of a green color, with wing covers rounded at the tips and shorter than the wings, a short bent piercer, and in the male a long tapering projection from the under side of the body; it measures in the body  $\frac{1}{4}$  of an inch, and to the end of the wings about  $1\frac{1}{2}$  inches; it comes to maturity early in September. 5. The common meadow grasshopper (*orchelimum vulgare*, Harris), so numerous near the end of summer at different ages, is of a general green color, with a brown stripe on the top of the head and thorax; it measures at maturity about  $\frac{1}{4}$  of an inch to the end of the body, and  $\frac{1}{2}$  of an inch more to the end of the semi-transparent wing covers; the shrilling organs consist of a transparent glassy spot in the overlapping portion of each wing cover, which is larger and stronger proportionally than in other grasshoppers; the hindmost thighs are smooth, there are 2 spines on the middle of the breast, and the antennæ extend beyond the end of the hind legs. An allied species (*O. agilis*, De Geer), found in the middle and southern states, has the wings longer than the covers by  $\frac{1}{10}$  of an inch, antennæ more than 2 inches in length, and a less curved piercer; the *O. gracile* (Harris) is of smaller size and more slender shape. 6. The sword-bearer grasshopper (*conocephalus ensiger*, Harris) has the head conical, extending to a blunt point between the eyes, and a long, straight, sword-shaped piercer; it measures an inch to the end of the body, and an inch more

to the end of the wing covers; it is pale green, with whitish head, and pale brownish green legs and abdomen. Another species is *C. dissimilis* (Serville).—The young grasshopper comes from the egg without wings; passing through several moultings, the body increases in size and length, and little stump-like wings appear; the wings gradually become longer with each change of skin, the insect hopping about by means of its muscular hind thighs; after ceasing to grow, the wings are perfect organs of flight, and the grasshopper enters upon its short life of activity, song, and reproduction; the song by degrees becomes less, the body shrivels, the legs wither, the appetite ceases, and in 3 or 4 weeks the whole number are dead. The larvæ remain in the earth or wherever the eggs are deposited all winter, and are hatched in the spring; they are voracious as larva, pupa, and perfect insect, and in all these stages are eagerly devoured by fowls, especially by turkeys.—The green grasshopper of Europe (*L. viridissima*, Latr.) is 2 inches long, of a fine green color, without spots. The *L. verrucivora* (Fabr.) is green, with the wing covers spotted with brown and black; it bites severely, and the Swedes are in the habit of submitting their warts to its mandibles, asserting that after its bite the warts quickly disappear. There are many other species in different parts of the world, but none merit attention for their destructiveness in comparison with the locusts; war is rarely waged against grasshoppers, as their natural enemies, birds, domestic fowls, and sand wasps, keep them within proper limits.

GRATIAN (AUGUSTUS GRATIANUS), emperor of Rome, born in Pannonia in 359, slain at Lugdunum (Lyons) in 383. His father, Valentinian I., bestowed upon him the title of Augustus in his childhood, but when he died in 375 the officers of the army compelled Gratian to give his half brother Valentinian II., then a young child, a share in the western empire, the East being in the hands of his uncle Valens. Gratian received Gaul, Spain, and Britain, and reigned over Italy, Illyricum, and Africa, as guardian of his brother. Great severity marked the beginning of his reign. When the East was attacked by the Goths, Gratian was delayed in aiding his uncle by another incursion of barbarians from the north; and when he finally marched to his rescue, he received the news of his defeat and death (378), which made him the ruler of both parts of the empire. In the next year, however, he ceded the East to the younger Theodosius, who after the death of his father had fled to Spain. Several wars with barbarous tribes on the Rhine and Danube were successfully terminated, and Gratian, who is praised by both Christian and pagan historians as just, moderate, and virtuous, was now able to enjoy a few years of repose at his residence in Milan, where he became the friend of St. Ambrose. By the confiscation of the property of the temples and the abolition of the privileges of the heathen priests, he greatly contributed to the

final downfall of the ancient religion. A military rebellion, which broke out in Britain under Maximus, and spread to Gaul, deprived him of his throne and life.

GRATIOT, a central co. of the S. peninsula of Michigan, drained by Pine and Maple rivers; area, 576 sq. m. It has an undulating surface and a productive soil, partially covered with pine timber. It is not included in the census of 1850.

GRATTAN, HENRY, an Irish statesman and orator, born in Dublin in 1750, died in London, May 14, 1820. He was the son of an eminent barrister, who was for many years recorder of Dublin and also a member of the Irish parliament. In 1763 he entered Trinity college, Dublin, and was graduated with distinction in 1767. His original plan was to study for a fellowship in Trinity, but yielding to the desires of his friends he removed to London and became a student in the Middle Temple. His admiration for the eloquence of Lord Chatham soon led him to the firm determination of becoming an orator. He was admitted to the Irish bar in 1772, and in 1775 became a member of the Irish parliament as representative of the borough of Charlemont. He joined at once the opposition, and united with Flood and the leading patriots of the day in endeavoring to obtain the grant of free trade for Ireland. On April 19, 1780, he introduced and supported with great eloquence the famous declaration of right, denying the power of the British parliament to legislate for Ireland; but his motion was lost. He had rendered himself, however, the idol of the Irish people; he fired their national spirit, and through his influence the volunteer bands assembling from all parts of Ireland were swelled to the number of 80,000. These volunteers held a meeting at Dungannon in Feb. 1782, and passed unanimously the resolution drawn up by Mr. Grattan, that "a claim of any body of men, other than the king, lords, and commons of Ireland, to make laws to bind this kingdom, is unconstitutional, illegal, and a grievance." Mr. Grattan gave notice that on the 16th of the following April he would repeat his motion in the house of commons for a declaration of Irish right. At the appointed day Mr. Grattan, although scarcely recovered from a severe illness, delivered one of his most forcible orations. The resolutions were carried by an overwhelming majority. Mr. Fox decided instantly to yield, and soon after brought in a bill for repealing the act (6 George I.) by which the British parliament claimed the right to bind Ireland by British laws. Grattan was now the most popular man in Ireland, and parliament proposed to vote him £100,000 "as a testimony of the national gratitude for great national services." It was only at the earnest request of his friends that he agreed to accept half the amount. During the following sessions of parliament he found a bitter and sarcastic opponent in Mr. Flood, who encouraged the story which had been set on foot, that Grattan having received

his pay had ceased to be a patriot. In 1785, by his opposition to the propositions regarding the trade between Great Britain and Ireland known as Ord's propositions, he regained his popularity, which he had temporarily lost. In 1790 he was returned to parliament by the city of Dublin. On the arrival in 1795 of Earl Fitzwilliam, he associated himself with that nobleman in originating plans for the peace and prosperity of his native country. Upon the earl's recall dissensions arose, and the society of united Irishmen proposed even to form a republic, and opened intercourse with France to gain help. Mr. Grattan, after advising conciliatory measures in vain, withdrew from parliament. When Mr. Pitt proposed measures for uniting Great Britain and Ireland he again obtained a seat in parliament as member for Wicklow, for the express purpose of opposing this measure; but when the union had been effected he entered the imperial parliament as representative of the borough of Malton in 1805, and of Dublin in 1806. In opposition to the corporation of his native city, he advocated Catholic emancipation, and toward the close of his life undertook a journey to London, while in feeble health, in order to present a petition from the Catholics to the house of commons. When his friends remonstrated, he replied that he would be happy to die in the discharge of his duty, and he did in fact sink under the exertion soon after his arrival in London.—Mr. Grattan was below medium stature, and of exceedingly unprepossessing appearance. He would often stride through the streets with his long arms swinging, and occasionally gesticulating, perfectly absorbed in thought. It is related that when he spoke the audience during the first 5 minutes could hardly restrain its laughter, so awkward was his manner. His style of oratory was impassioned, and he was frequently entirely carried away and overcome by his subject. His private character was without a blemish. Mr. Grattan's speeches were edited by his son Henry Grattan (4 vols. 8vo., London, 1822), and a selection from them by D. O. Maddyn, with a commentary on his career and character (8vo., Dublin, 1845). A volume of his miscellaneous works appeared in 1822, and his "Life and Times" by his son in 1839-'46 (5 vols. 8vo., London).

GRATTAN, THOMAS COLLEY, an Irish novelist, born in Dublin in 1796. He studied law, and subsequently procured a commission in the army; but resigned both professions upon his marriage, and afterward resided in France. At the age of 25 he commenced the career of an author by the publication of "Philibert," a metrical romance, which met with a very moderate success. He next became a contributor to various magazines and reviews, and in 1823 published in 2 vols. 8vo. the first series of "Highways and Byways," tales of continental adventure and wandering, written in an agreeable and picturesque style. The favor with which these were received induced him to publish a second series in 1824, and a third in 1827, each in 3 vols.



Establishing himself in Brussels, he wrote a number of works, of which "Traits of Travel" (3 vols. 8vo., 1829), the "Heiress of Bruges" (4 vols., 1830), "History of the Netherlands" (12mo., 1830), "Jacqueline of Holland" (12mo., 1842), and "Legends of the Rhine" (3 vols. 8vo.), are the best known. Having actively supported the pretensions of King Leopold in the Belgian revolution of 1830, at the request of that sovereign he was appointed, in 1839, British consul to Massachusetts, a position which he held until 1853. His last work, entitled "Civilized America" (2 vols. 8vo., London, 1859), is a record of his experiences of men and manners in North America.

GRATZ, or GRÄTZ, a circle of Austria, in the N. part of Lower Styria; area, 2,658 sq. m.; pop. 448,528. It has copper, lead, and iron mines.—GRATZ, the capital of the above circle and of the province of Styria, is situated on the Mur, 96 m. S. W. of Vienna, and 1,486 feet above the level of the sea; pop. 65,050. It consists of the town proper, which occupies the left bank of the river, and is fortified, and of 4 suburbs connected with the town and with each other by bridges. The chief public buildings are a magnificent Gothic cathedral erected by Frederic IV. in 1456; St. Catharine's chapel, built as a mausoleum by Ferdinand II., whose remains repose here; the Landhaus, where the estates of Styria hold their sessions, when convoked; the old palace of the Styrian dukes; the university, founded in 1586, with a library containing 100,000 volumes and 7,500 MSS.; the Johanneum, an institution established in 1811 by Archduke John for the encouragement of the arts, sciences, and manufactures of Styria; and the refectory or *convicta*, which is the largest building in Gratz, and which, though formerly belonging to the Jesuits, is now a collegiate school. There are also 20 churches, 4 monasteries, 3 nunneries, &c. The principal manufactures are cotton, woollen, silk, hardware, leather, paper, &c. It is connected with Vienna and Trieste by railway.

GRAUDENZ, a fortified town of W. Prussia, in the government of Marienwerder, on the right bank of the Vistula; pop. 10,800. It has manufactories of cloth, tobacco, and carriages, several breweries and distilleries, a considerable trade in cloth and corn, some shipping, and 4 annual fairs.

GRAUN, KARL HEINRICH, a German composer, born in Wahrenbrück, Saxony, in 1701, died in Berlin, Aug. 8, 1759. He studied music in Dresden, subsequently became tenor and composer to the opera house in Brunswick, and in 1740 was appointed by Frederic the Great his chapelmaster, a position which he occupied during the remainder of his life. Frederic was much attached to him, and shed tears upon hearing of his death. He is the author of 30 operas, and an immense number of cantatas and miscellaneous pieces. His best works are the oratorio *Der Tod Jesu*, and his *Te Deum*.

GRAVE CREEK, a post village, capital of

Marshall co., Va., 12 m. below Wheeling, on the left bank of the Ohio, between two streams called Big and Little Grave creeks; pop. 1,200. The village contains an academy and 2 steam flouring mills. In the vicinity is the Grave Creek mound, one of the largest of the ancient mounds in the United States, and one of the most interesting of American antiquities. It is connected with a series of earthworks of ancient construction, and is 820 feet in circumference at the base, about 70 feet in height, and at the summit 68 feet in diameter. In 1838, a shaft was sunk from the apex of the mound to its base, and a horizontal tunnel made from the exterior of the base to the centre. Two sepulchral chambers were found, one at the base, the other 30 feet above it. These chambers had been constructed of logs and covered with stones, but had sunk in from the decay of the woodwork. One skeleton was found in the upper chamber, and two in the lower. There were also found in these chambers nearly 4,000 shell beads, a number of ornaments made of mica, copper bracelets, and articles carved in stone. Ten other skeletons in an advanced stage of decay were found in making the excavation. It is supposed that this mound was erected over the graves of a distinguished chieftain and his family. It is asserted that among the articles dug from it was a small stone on which was sculptured an alphabetical inscription. This tablet is of dark, compact, silicious rock, and is of oval shape, 1½ inches in length and 1½ inches in breadth. It is of rude workmanship, but the characters are all distinct. The inscription consists of 8 lines and of 23 characters, with an idiographic sign. Much diversity of opinion exists as to the nature and origin of this inscription. By some antiquaries it is supposed to be Celtiberic, by others Libyan, and by others Phœnician. The authors of the Smithsonian work on "The Ancient Monuments of the Mississippi Valley" expressed much doubt of the genuineness of the relic. But Dr. Wills De Hass, of Virginia, in a paper recently read before the American ethnological society at New York, discussed the question elaborately, and adduced evidence and arguments which seem to establish the authenticity of the tablet. He maintains that similar ones have been found in the mounds composing the Grave Creek group, among others a small globular stone having 5 characters enclosed in a cartouche. Dr. De Hass is at present (1859) engaged, as chairman of the committee on archaeology and ethnology of the American association for the advancement of science, in examining the other mounds of the Grave Creek group. Two chambers in the great tumulus are yet unexamined.

GRAVEL, small stones, commonly intermixed with sand, and sometimes with clayey or calcareous earth. Such a mixture constitutes the principal portion of the drift formation; and where this prevails, the surface of the country is often covered to unknown depths with deposits of sand and gravel. It forms hills through-

out New England, and nearly the whole of Long island is covered with it. (See *DILUVIUM*.) It is of more recent formation wherever rocks, especially the granitic, are comminuted by joint action of atmospheric and fluvial agents, and their materials are gathered in the bed and banks of swift running streams. Upon the beaches of seas and lakes, the gravel, piled up in beds of coarse pebbles and washed clean of sand and all earthy matters, is called shingle.

GRAVEL, substances consolidated and precipitated from the urine within the body, in certain diseased conditions of the system, differing from calculi by their small size, and generally voided without surgical interference. (See *CALCULI*.) The appearance of gravel is important as evidence of a disposition to calculous deposits, and as indicating the proper treatment. When the disposition exists, any thing which obstructs the passage of urine favors the precipitation of gravel. There are 8 kinds of gravel, as there are 8 principal forms of calculi, viz: the lithic, the oxalic, and the phosphatic. Lithic or uric acid, a highly nitrogenous compound, exists normally in the urine in combination with ammonia; if the urine be abnormally acid, the lithic acid will be precipitated in a crystalline form, constituting the lithic or red gravel; lithic acid when pure is white, but in human urine it assumes the tint of its coloring matter, causing it to look like Cayenne pepper. The urine containing this gravel is generally acid, high-colored, scanty, but clear; in what is called a "fit of the gravel," this acid is precipitated in large quantity, accompanied by fever, pains shooting from the loins to the bladder, frequent and scalding micturition, &c. The causes which predispose to the excessive formation of lithic acid have been detailed in the article *GOUT*, with which disease gravel is intimately connected; it will be sufficient to say here that the use of highly nitrogenous food and stimulating drinks, and sedentary or slothful habits, are very likely to induce both gout and lithic acid gravel. Though not unfrequently occurring in children, gravel is most common between the ages of 40 and 65; it is comparatively rare in warm climates, or in persons living chiefly on vegetable food. On the principles of Liebig, alluded to under *GOUT*, the great indication for the treatment of the red gravel is to promote the action of oxygen or lithic acid so as to cause its conversion into urea and carbonic acid, and its consequent escape from the system through the urine and the perspiration—in other words, to take in an increased supply of oxygen by exercise in the open air, by preparations of iron, and by the nitro-muriatic acid; to moderate the quantity of highly nitrogenous food, avoiding that containing much starch and sugar, as well as malt and fermented liquors; to secure a healthy action of the skin by suitable clothing and attention to cleanliness; to remove all intestinal obstructions, and to neutralize acidity, if necessary, by the administration of alkalies.—The lithic acid gravel

may be regarded as the sign of an inflammatory or congestive habit, but the next form, or the oxalic acid gravel, belongs to an irritable or nervous constitution, and is usually accompanied by a dry skin, dyspepsia, boils, carbuncles in advanced life, and nervous exhaustion or despondency; the urine is transparent, pale greenish yellow, of moderate specific gravity, and free from sediments, but containing minute crystals of oxalic acid. The causes of this diathesis are such as produce dyspepsia, nervous debility, and hypochondriac diseases; residence in malarious districts, and unwholesome vegetable food. The treatment is very much that of the lithic acid gravel, it being remembered that in this case the system craves less oxygen; distilled water is advised in order that lime may not in this way be introduced into the system and endanger the formation of mulberry calculi; alkalies with ammonia, tonics, and the mineral acids, are required according to circumstances.—The white gravel may be either the ammoniacomagnesian phosphate or the phosphate of lime, or the mixture of the two; the phosphates of the urine, naturally held in solution, from deficiency of acid or presence of ammonia, may be deposited as the first or triple phosphate, with pale and copious urine, soon becoming ammoniacal, displaying on its surface the small white crystals of the ammoniacomagnesian phosphate. The phosphate of lime is deposited as an impalpable white powder by the irritated mucous membranes, generally at the same time with the former. The phosphatic diathesis is generally seen in pale and weak persons, complaining of nervous exhaustion, as Dr. Prout maintains, on account of the great consumption of phosphorus in nervous diseases; it may be produced by excessive fatigue of body or mind, intense study, unwholesome food, weakening medicines, and chronic urinary affections. The treatment should consist of medicinal, hygienic, and alimentary tonics, acids, and substances like buchu, pareira brava, and uva ursi, which calm irritation of the urinary mucous membrane.

GRAVEL WALLS. The application of gravel to the construction of walls is of recent introduction in the United States. In many places the exterior walls of houses of considerable pretensions are made of it; and its use for this purpose is recommended on the score of economy and durability. The method of construction is very simple. Upon a suitable foundation of stone laid in hydraulic cement above the moisture of the ground, 2 planks are temporarily secured on their edges, and the thickness of the proposed wall apart. Between these the gravel wall is commenced by depositing wheelbarrow loads of gravel freshly mixed with sand and lime, as in making mortar. The proportion of lime need not exceed  $\frac{1}{4}$  of the whole, provided the gravel is clean with no mixture of loam or clay and the lime is strong. Rough angular stones are better than smooth pebbles; broken bricks, cinders, &c., may be thrown in, and among them some stones of 50 or 75 lbs.

weight. By dropping the materials between the planks from some height they pack more closely than if gently laid in. As the wall reaches the upper edge of the board or plank casing, another tier of the same is added, and when this space is filled up, the lower tier is taken off and added to the upper; and so they are alternately raised one over the other, till the wall has reached the height required. The casing is prevented from spreading by being fastened to sticks laid across the wall, which may be covered over and left in. Frames for doors and windows are set in their places, whenever the wall reaches the level on which they are to stand. The work should not be interrupted at any time so long as to permit the upper layers to set and become dry, and care should be taken not to remove the casing at the bottom before the wall has hardened sufficiently to support itself. During the progress of the work it is essential to protect it from the rain; and it is well to continue this care for some days after the materials appear to have assumed a solid state. Many cases have occurred of the walls of a house being completely washed down in consequence of neglect of this precaution. When finished they should be sheltered by projecting eaves. If to be stuccoed, more care should be taken to keep the outside smooth and even than if it is to be left uncovered. A sufficient thickness for walls 25 feet high is 16 inches for the lower half and 10 or 12 for the upper. A house of this description, the construction of which was observed by the writer, of octagonal form, measuring 16 feet on a side, or 128 feet in circumference, was raised by the labor of 3 men at the rate of one foot a day. The wall was 14 inches thick; the proportion of lime, unusually large, was  $\frac{1}{10}$  of the whole. The total cost, including the materials, was estimated at \$12 per foot in height; or, making no deduction for spaces for doors and windows, 8 cents per cubic foot.

GRAVES, a S. W. county of Ky., bordering on Tennessee, and drained by Mayfield creek and Obion river; area, 515 sq. m.; pop. in 1850, 11,897, of whom 1,489 were slaves. The surface is level, and the soil generally productive. In 1850 it yielded 653,888 bushels of Indian corn, 15,086 of wheat, 115,979 of oats, 1,090,545 lbs. of tobacco, 17,657 of wool, and 10,982 of flax. There were 17 corn and flour mills, 6 saw mills, 1 woollen and 4 cotton factories, 83 churches, and 1,150 pupils attending public schools. Value of real estate in 1855, \$1,512,844. Formed in 1828, and named in honor of Major Benjamin Graves, who was slain at the battle of the river Raisin. Capital, Mayfield. The New Orleans and Ohio railroad, when completed, will pass through this county.

GRAVESANDE, WILLEM JACOB VAN 's, a Dutch philosopher and mathematician, born in Bois-le-Duc, Sept. 27, 1688, died in Leyden, Feb. 28, 1743. He published at the age of 18 an essay on perspective, which was applauded by Bernouilli. At the same time he published

a philosophical thesis on suicide. After completing his studies in the university of Leipzig in 1707, he was admitted to the bar at the Hague, where he wrote for the "Literary Journal" an examination of Fontenelle's "Geometry of the Infinite," a dissertation on the construction of the air pump, one concerning the force of bodies, in which he embraced the opinion of Leibnitz against that of Newton, which he had formerly defended, and dissertations upon the motion of the earth, &c. In 1715, being sent as secretary of legation to London to congratulate George I. on his accession to the throne, he was there admitted a member of the royal society. In 1717 he was appointed professor of mathematics and astronomy in the university of Leyden, and exchanged his chair in 1784 for that of philosophy, which he held till his death. His philosophical writings are marked by the precision to which mathematical studies had habituated him; but being unable to decide between the doctrines of Locke, Descartes, and Leibnitz, he borrowed ideas from each. He was the first to introduce the theories of Newton upon the continent. His principal works are: *Physices Elementa Mathematica* (3 vols. 4to., the Hague, 1720-'42); *Matheseos Universalis Elementa* (8vo., Leyden, 1727); *Introductio ad Philosophiam, Metaphysicam, et Logicam* (Leyden, 1736-'7).

GRAVESEND, a municipal borough, town, and river port of England, in the co. of Kent, on the right bank of the Thames, 21 m. S. E. of London, with which it is connected by railway; pop. in 1851, 16,638. The principal public edifices are the town hall, parochial church, where Pocahontas is buried, literary institution, theatre, &c. Ship building is carried on to a considerable extent, but the chief trade arises from supplying outward bound ships with stores and clothing.

GRAVINA, GIOVANNI VINCENZO, an Italian jurist and man of letters, born in Roggiano, Jan. 20, 1664, died in Rome, Jan. 6, 1718. While studying law at Naples he perfected himself in the Greek language, commenced essays on poetry, and composed two dramas. Subsequently he devoted himself to the civil and the canon law, went to Rome in 1689, published several brief works on morals and literature, and in 1695, having collected 15 of his friends in his garden, organized them into the celebrated academy of the Arcadians. Pope Innocent XII. offered him the highest ecclesiastical honors, but he refused to enter the priesthood. In 1699 he was appointed to the chair of civil law in the college of La Sapienza, which he exchanged in 1703 for that of the canon law. He soon after published his works on the "Origin of the Civil Law" and on the "Roman Empire." On account of the literary jealousies of the time a schism took place in 1711 in the academy of the Arcadians, and Gravina and his friends withdrew and founded the academy of the Quirina. Gravina was the adoptive father of Metastasio, whom he made his principal heir.

GRAVITY, or GRAVITATION, the mutual attraction of bodies of matter. From the earliest times men were familiar with two sets of simple and unvarying phenomena—the fall of heavy bodies set free above the earth's surface, and the pressure of such bodies on the surface or on any support. These facts, equally applicable to their own physical organization, they must early have roughly generalized into laws. Another set of facts, apparently very different, speedily claimed and received attention. Thousands of years before the principles of the inductive philosophy were formally stated, or its fruits began in any large sense to be attained, curiosity led patient observers to chronicle the phenomena that could alone pave the way for the distant yet possible discoveries of natural law. The places, paths, and times of the heavenly bodies were so correctly made out and recorded, that, even before the true cause of their movements had been conjectured, successive erroneous views of those movements had given way before the true, heliocentric theory. It was not until about the close of the 16th century of our era that the work of properly analyzing and explaining these stores of fact was commenced. Kepler began, in one direction, to prepare the way by including a vast amount of the results of previous astronomical observation in the three laws which bear his name. In the other direction, every language had, of course, its name for that manifestation of downward pressure of bodies near the earth which we call weight. With the Latins this tendency was named *gravitas*, whence our term gravity. Archimedes studied specific gravity, and determined the centre of gravity, empirically, and without arriving at their cause. Galileo first successfully investigated the cause or force producing gravity of bodies near the earth's surface, showing that this force is a continual or constant one, and deducing the rate of acceleration of the motion caused by it. The idea of a centripetal force, by which the planets would tend to the sun, seems at the same time to have been slowly forming itself in the minds of philosophers. Kepler spoke of an immaterial virtue or magnetic nature of the sun; but he explained the planetary motions rather by an existing vortex of fluid in which they were carried along, than by a present, acting energy. Descartes supposed a number of these vortices corresponding to the number of the planets. Gassendi seems to have ascribed the motion to traction by fibres, like those of muscles; Leibnitz, to agitations of an ether. Borelli, in 1686, seems to have anticipated Newton, though without demonstrating the truth that the central orb "draws and holds" those revolving around it; while between this drawing and a tendency to recede from their centre of revolution, the latter would be kept in their orbits. In England, Gilbert, Boyle, Horrocks, Wren, Halley, and Hooke, and in Holland, Huyghens, approached more or less clearly the idea of a central force acting toward the

sun; and by some of these observers the true rate of decrease of the attractive force with distance was understood. Wren, Hooke, and others, contested Newton's priority in the discovery, of the truth of which, however, none of them had furnished the required mathematical and deductive proof. The credit due to Sir Isaac Newton, then, is not that of having discovered the principle of gravity, which in a degree all men understood; nor of having first imagined a central force acting toward the sun, nor the ratio of its diminution with increase of distance; and perhaps not even of having been the first to conjecture the identity of this central force with terrestrial gravity. But the steps by which he set out to prove or disprove the truth of these conceptions, and the results which he deduced from the truth when determined, sufficiently attest his claim as the substantiator, and therefore, in the ethics of science, the discoverer (for the field of the solar system), of the law of gravitation—"the greatest scientific discovery ever made." In Kepler's second law, that the *radius vector* of the orbit of a planet sweeps over equal areas in equal times, Newton found proof of the necessity of a central force acting toward the sun; in the first law, that the orbits are ellipses, he found the confirmation of the principle of diminution of action of the force in the ratio of the inverse square of the distance; and from the third law, that the squares of the periodic times of the planets are as the cubes of their mean distances from the sun, he inferred that the same force, diminishing in such ratio, must pervade the entire system. Here, then, was a complete law of planetary gravitation; though the cases of perturbations, of the satellites, and of falling bodies at the earth, were not yet included. To link these with the former, he commenced with the case of the earth and her moon. The story that Newton was first led to this essential step, during his retreat from Cambridge in 1666, the summer of the plague, by reflections excited upon witnessing the fall of an apple from a tree under which he was sitting, although discredited by Brewster, is reaffirmed by a more discriminating writer, Biot, who cites the confirmation of the story by Mr. and Mrs. Conduit, the latter the niece of the philosopher, and the fact that Pemberton used to point out the very garden in which the tree stood. We may safely leave to the orators their favorite illustration, when we reflect that no mind, not already busied with the problem, and far advanced in the analysis of its conditions, could have perceived the significance of so humble and common a phenomenon. By some train of thought, it is certain, the philosopher was led to inquire why the force acting from the earth should cease at the height from which bodies are known to fall; why at 10, 100, or 1,000 miles; and why it should not act even at the distance of the moon. If it did, the moon should be incessantly falling toward the earth, and by an amount as much less than the fall of a body near the earth

as the square of the distance of such body from the earth's centre is less than the square of the distance between the centres of the moon and earth. Now, the fall or deflection of the moon from a line tangent to any part of her path, as already deduced from observation, was known to be about 15 feet per minute; while near the earth a body falls  $16\frac{1}{2} \times 60^2 = 57,960$  feet, in the same time. The moon's distance, as determined by her parallax, varies in different parts of her orbit, and at different parts of the earth's surface, from about 56 to about 64 times the length of the earth's radius, or semi-diameter. Newton assumed the distance as at that time deduced from the supposed radius of the earth; but the result of his calculation gave a fall of 18 feet only; and unsatisfied with such an approximation, he dropped the subject for many years. In the mean time, Picard having executed a more accurate measurement of a portion of a meridian, the length of the earth's radius, and as a consequence the distance of the moon, became more correctly known; and learning these facts, Newton in 1682 resumed his calculations. Taking the moon's distance at 61 times the earth's radius, he found that  $57,960 \text{ feet} \div 61^2$  gave the gratifying result of a fall of a little more than 15 feet per minute at the moon, an amount almost exactly coincident with that known through actual observation to occur, and which should have been found if the estimates were correct, and the force acting upon the moon were the same as that operating on terrestrial bodies. Thus was established the cosmical character of the force of gravitation. Verifications for the satellites of the other planets, and the perturbations of the bodies of our system, rapidly followed. Subsequently, the tides, the figure of the planet, the precession of the equinoxes, and the revolutions of comets, were brought under the same law. The complex movements of the planetary bodies, which for ages had perplexed the profoundest minds, now at once became, through an understanding of the simple laws of motion and of that of the gravitation of all bodies within the system toward each other, comprehensible by every pupil of ordinary ability. But yet, again, Newton had not discovered universal gravitation; and only by conjecture could his law be applied to bodies beyond our solar system. Newton had correctly inferred, however, that gravitation is a force acting between all bodies, and even all the molecules of bodies, so far as it can be known to extend; and that it is proportional in every case to the mass of matter acted upon. A few important experiments may be named which have since served to corroborate the law in these particulars. In 1774 Maskelyne suggested an observation of the effect of the mass of Schiehallion, a mountain in Scotland, upon the plumb line; the result was the discovery of the deviation of the plummet toward the mountain to the extent of nearly 6" of a degree. Observations made by Bouguer and others upon the influence of other mountain masses have since confirmed this re-

sult. About the same time, by the use of a delicate torsion balance, in which the force of attraction was determined by the amount of twist produced in a slender suspending wire, Cavendish showed the ratio of the attraction of known masses to that of the earth as a whole, and also the equal attraction of equal masses of whatever kind. But doubts having still been suggested in regard to this part of the law, Bessel more recently took up the subject and in 1832 published results showing that for every substance examined, including not only those ordinarily known, but also meteoric stones and metals, the gravitating force was exactly proportional to the inertia, and hence to the quantity of matter. It was reserved for the two Herschels to carry the law beyond the limits of our system, by showing its operation in the instances of double and multiple stars, the components of several of which have been found to have a mutual revolution in ellipses about each other, and some of these in known times varying between 80 and 608 years; and thus to render the law a universal one. The observations of Mädler and others in reference to a supposed rotation of our distinct stellar system about some centre, probably at or near the star Alcyone of the Pleiades, promise further to confirm this view. In its present form, then, the law of gravitation, probably the broadest inductive generalization yet reached in physical science, may be thus stated: All bodies, of whatever kind, at finite distances, are incessantly attracted toward each other with a force that, between any two of them, is mutual and equal, and acting in the direction of a line joining the centres of their masses, and that, in magnitude, is directly as the masses, and inversely as the squares of the distances between their centres.—A few points remain to be named. Gravitation, the most feeble of physical actions, is between small masses almost imperceptible; yet it is an energy abundant in proportion to the quantity of matter in the universe, and fully competent, by its gradual condensing agency, to account for the origination of planetary systems and their movements. It is not strange, therefore, that by some physicists this energy is beginning to be supposed to be that of which all other forms of force are residues or metamorphoses. Gravity is the name especially given to its terrestrial manifestation. A particle or body without a sphere or spheroid, solid or hollow, is attracted to the centre of the mass of such body; within a hollow sphere, it will remain at rest at any point. At different depths below the earth's surface, a body will be attracted with a force diminishing as the distance from the centre decreases. The slight variation in the gravitating force of the same falling body at different heights is in practice usually disregarded. The weight of a body, as the measure of its gravitating tendency, must vary both with mass and with the force acting on it; hence, from the form of the earth, the same body at the sea level will weigh less and

less as it is removed from either pole toward the equator. An elevation above the sea level gives a like result. A stone falls through a less distance in a given time on a mountain than in the valley below, less at the equator than at either pole; and the oscillations of a given pendulum, under the same circumstances, are less rapid in a similar degree. The loss of weight in these cases cannot be tested by ordinary scales or steel-yards, in which this loss is equal on both sides; but it may be by the spring balance, in which bodies are weighed by the pull they exert against the elasticity of a coiled wire. The effect of centrifugal force, increasing from the pole to the equator, cooperates with increasing removal from the earth's centre to lessen weight; the result of the combined action of these two causes is, that a body weighing 195 lbs. at either pole will weigh but 194 over the equator. The line of a falling body, called also the line of direction, is interesting as being that direction in space at any point of the earth's surface with reference to which all other directions are named, and by which they are to be determined.

GRAVITY, *Specific*, the proportion of the weight of a body to that of an equal volume of some other substance adopted as a standard of reference. For solids and liquids the standard is pure water, at a temperature of 60° F., the barometer being at 30 inches. Aëriform bodies are referred to the air as their standard. A cubic foot of water weighing 1,000 ounces, if the same bulk of another substance, as for instance cast iron, is found to weigh 7,200 ounces, its proportional weight or specific gravity is 7.2. It is convenient to know the figures representing this proportion for every substance in common use, that the weight of any given bulk may be readily determined; and for all substances the specific gravity is used among other tests for the purpose of distinguishing bodies from each other, the same substance being found, under the same circumstances of temperature, &c., to retain its peculiar proportional weight or density. Hence tables of specific gravities of bodies are prepared for reference, and in every scientific description of substances the specific gravity is mentioned. In practical use, the weight of a cubic foot is obtained from the figures representing the density by moving the decimal point 8 figures to the right, which obviously from the example above gives the ounces, and these divided by 16 the pounds avoirdupois, in the cubic foot. Different methods may be employed to ascertain the specific gravity of solids. That by measuring the bulk and weighing is rarely practicable, nor is it desirable. As a body immersed in water must displace its own bulk of the fluid, the specific gravity may be ascertained by introducing a body, after weighing it, into a suitable vessel exactly filled with water, and then weighing the fluid which is expelled. The proportional weight is then at once obtained. Wax will cause its own weight of water to overflow; its specific gravity is then 1. Platinum, according to the condition it is in, will

cause only from  $\frac{1}{11}$  to  $\frac{1}{31.3}$  of its weight of water to escape, showing its specific gravity to be from 21 to 21.5. But a more exact method than this is commonly employed. The difference of weight of the same substance, weighed in air and when immersed in water, is exactly that of the water it displaces, and may consequently be taken as the weight of its own bulk of water. The specific gravity then is obtained by weighing the body first in air, and then, suspended by a fibre of silk or a hair, in water, and dividing the weight in air by the difference. It is hardly necessary to say that the substance examined must be free from mixture of foreign matters, and especially from cavities that may contain air. Minerals, if suspected to contain such, should be coarsely pulverized, and then the second method above may be conveniently applied to determine their density. Thus prepared, a higher result will be obtained, and even metals when pulverized were found by Rose to give a greater specific gravity than when this is determined from samples in their ordinary state. Very fine powders may also be determined by the method in use for ascertaining the specific gravity of fluids, viz.: by comparing the weight of a measured quantity with that of the same quantity of water. A glass vessel called a specific gravity bottle is commonly employed, which is furnished with a slender neck, upon which is a mark indicating the height reached by 1,000 grains of water. The substance to be examined is introduced till it reaches the same mark, and, the weight of the empty bottle being known, only one weighing is required to obtain the result. The simple method sometimes adopted for testing the purity of gold coin is similar to this. If the coin is adulterated, it is with a lighter metal. It is first weighed against a genuine coin, and if right in this respect, it is next applied to a slit in which the genuine coin just fits; any difference of bulk, either in thickness or diameter, is readily detected, and shows the piece to be false. The specific gravity of fluids is also taken by the instrument called a hydrometer or areometer, of which several are in use, slightly differing in construction, but all dependent on the principle that the weights required to immerse a light body, as a bulb of glass, in different fluids, are proportional to the densities of these fluids. Such instruments are much used for ascertaining the specific gravity of spirituous and other liquors, as an indication of their strength. (See *AREOMETER*, and *HYDROMETER*.) If the solid body to be tested is lighter than water, it must be attached to some heavy substance to cause it to sink. Its specific gravity is then calculated by dividing its weight in the air by the sum of the weights of the attached body both in air and in water, first subtracting from this sum the weight of the two bodies together in the water. Bodies soluble in water may be weighed in some other fluid, as alcohol, ether, olive oil, &c., and their proportional weight to that of this fluid being thus ascertained, their

density compared with that of water is readily calculated; or they may be enveloped in wax or other suitable substance to protect them, and then treated by the method just given for substances lighter than water. Gaseous bodies are weighed in a thin glass flask or other vessel made for the purpose, and provided with a stop-cock. The vessel is exhausted of air before the introduction of the gas. The experiment requires particular care, as the result will be found to vary under different conditions of pressure, temperature, and the hygrometric state of the atmosphere. The temperature of the air should be 60° and barometric pressure 30 inches. The specific gravities may also be calculated from the atomic weights of the gases: when the atomic volume is equal to that of hydrogen, it is obtained by multiplying the specific gravity of hydrogen by the atomic weight of the gas; when the atomic volume is half that of hydrogen, the specific gravity of the gas is equal to the specific gravity of hydrogen multiplied by twice the atomic weight of the gas; and when the atomic volume is twice that of hydrogen, the specific gravity of the gas is equal to the specific gravity of hydrogen multiplied by half the atomic weight of the gas.—The proportions of two ingredients in a compound, as in an alloy of gold and silver, may be found by multiplying the specific gravity of each ingredient by the difference between it and the specific gravity of the compound. As the sum of the products is to the respective products, so is the specific gravity of the body to the proportions of the ingredients; then as the specific gravity of the compound is to the weight of the compound, so are each of the proportions to the weight of its material.—The following table presents the specific gravities of substances most likely to be referred to, collected from various sources. The weight of a cubic foot in ounces avoirdupois is seen by moving the decimal point 8 figures to the right.

TABLE OF SPECIFIC GRAVITIES.

Acid, acetic.....	1.069	Anthracite.....	1.860
" arsenic.....	8.891	Antimony.....	7.602
" boracic, crys- tallized.....	1.479	Asphaltum.....	0.905
" boracic, fused.....	1.908	Barytes.....	4.000
" citric.....	1.064	" sulphate of (heavy spar).....	4.300
" hydrochloric.....	1.200	Basalt.....	2.854
" nitric.....	1.271	Beeswax.....	0.956
" aqua regia.....	1.583	Bismuth.....	9.323
" phosphoric, liquid.....	1.924	Brandy.....	0.857
" phosphoric, solid.....	1.558	Brass.....	7.924
" sulphuric.....	2.800	" wire.....	8.396
Alabaster.....	1.641	Brick.....	2.000
Alcohol, absolute.....	1.874	Bronze, gun metal.....	8.700
" of commerce.....	1.799	Butter.....	0.943
Ale or beer.....	0.835	Cadmium.....	8.600
Alum.....	1.794	Caoutchouc.....	0.938
Aluminum.....	2.560	Chalk.....	2.784
" to 3.670		Cinnabar.....	8.998
Amber.....	0.790	Clay.....	1.880
Ambergris.....	0.936	Coal, bituminous.....	1.090
Amethyst, common.....	2.750	Coal, bituminous.....	1.090
" oriental, or.....	3.909	Cobalt, cast.....	7.813
" violet sapphire.....	4.160	Copal.....	1.045
Ammonia.....	0.875	Copper, native.....	8.940

Copper cast.....	8.788	Mercury, common.....	13.580
" wire.....	8.878	" pure.....	14.000
" coin.....	8.915	Mica.....	2.750
Coral.....	2.540	Milk.....	1.032
" to 2.850		Myrrh.....	1.200
Diamond.....	3.521	Naphtha.....	0.790
" to 3.550		" to 0.847	
Dolomite.....	2.540	Nickel, cast.....	8.375
" to 2.580		Nitre (saltpetre).....	1.600
Earth, mean of the globe.....	5.210	Oil, castor.....	0.970
Emerald.....	2.678	" linseed.....	0.940
" to 2.775		" olive.....	0.915
Ether, sulphuric.....	0.682	" turpentine.....	0.870
" to 0.775		" whale.....	0.932
Fat of beef.....	0.928	Opal.....	2.114
Feldspar.....	2.400	Opium.....	1.287
" to 2.620		Palladium.....	11.500
Freestone.....	2.143	Pearl, oriental.....	2.510
Garnet.....	3.150	" to 2.750	
" to 4.300		Peruvian bark.....	0.754
Glass, bottle.....	2.738	Pewter.....	7.471
" crown.....	2.520	Phosphorus.....	1.770
" green.....	2.643	Platinum, native.....	17.000
" to 2.760		" to 15.000	
" flint.....	2.329	" refined.....	19.500
" to 2.760		" hammered.....	20.236
" plate.....	2.760	" wire.....	21.941
" of St. Gobain.....	2.488	" laminated.....	22.000
Gold, native.....	15.600	Porcelain, China.....	2.385
" to 19.500		" Sèvres.....	2.145
" pure, cast.....	19.258	Porphyry.....	2.428
" hammered.....	19.893	" to 2.273	
" coin.....	17.647	Potassium.....	0.805
" 25 carats fine.....	17.436	Proof spirit.....	0.923
" 20 ".....	15.709	Quartz.....	2.650
Granite, Quincy.....	2.652	" to 2.580	
" Staten Island.....	2.780	Rhodium.....	11.000
Graphite or plum- bago.....	1.987	Rosin.....	1.100
" to 2.400		Ruby.....	4.833
Grindstone.....	2.143	Salt, common.....	2.120
Gunpowder, loose.....	0.896	Sand.....	1.520
" to 0.900		" to 1.300	
" close shaken.....	0.987	Sapphire, oriental.....	3.994
" to 1.000		Serpentine.....	2.567
" solid.....	1.550	" to 2.567	
Gum Arabic.....	1.453	Silver, pure, cast.....	10.474
Gypsum, compact.....	1.873	" hammered.....	10.510
" to 2.288		" coin.....	10.584
Hellotrope or bl'd- stone.....	2.680	Slate.....	2.110
" to 2.700		" to 2.673	
Hematite iron ore.....	4.500	Slate.....	2.650
" to 5.300		Soapstone.....	2.500
Honey.....	1.456	Sodium.....	0.973
Hyacinth.....	4.000	Spermaceti.....	0.948
" to 4.750		Steel, hard.....	7.516
Ice.....	0.930	" soft.....	7.528
Iodine.....	4.943	Sugar, native.....	1.608
Iridium, hammered.....	28.000	Sulphur, native.....	2.063
" to 7.645		" fused.....	1.990
Iron, malleable.....	7.817	Tallow.....	0.941
" cast.....	7.207	Tar.....	1.015
" ore, magnetic.....	4.900	Tellurium.....	5.700
" to 5.900		" to 6.115	
Ivory.....	1.833	Tin, cast.....	7.291
" to 1.917		" hardened.....	7.299
Lard.....	0.947	" to 8.400	
Lead, cast.....	11.350	Topaz.....	3.450
" to 11.445		Tourmaline.....	3.900
" white.....	7.385	Tungsten.....	17.400
" ore, galena.....	7.250	" to 2.600	
" to 7.780		Turquoise.....	2.530
Lima, quick.....	0.804	Ultramarine.....	2.823
Limestone, com- pact.....	2.386	" to 1.013	
" to 8.010		Vinegar.....	1.030
" crystallized.....	2.732	Water, distilled.....	1.000
Magnesia, carb.....	2.223	" sea.....	1.025
" to 2.612		" Dead sea.....	1.240
Malachite.....	3.700	Wine, Burgundy.....	0.991
" to 4.000		" white cham- pagne.....	0.897
Manganese ore (pi- lomelane).....	4.380	Wood (see tables in article FUEL).....	
Marble, Carrara.....	2.716	Zinc, cast.....	7.190
" Parian.....	2.837		
" Egyptian.....	2.668		

GRAY (anc. *Griem*, *Griatum*, or *Greyacum*), a town of France, capital of an arrondissement of the same name in the department of Haute-Saone, on the left bank of the river Saone, 30

m. S. W. from Vesoul; pop. in 1856, 6,028. It is tolerably well built, though the streets are narrow; the principal edifices are a church, cavalry barracks, the government offices, a handsome bridge, and a public library of 4,000 volumes. An important trade is carried on by the river with Lyons and other places, in iron, grain, and timber. The chief manufactures are of hair cloth, fecula, starch, and leather. There are several boat building yards, and a flour mill which consumes about 140,000 bushels of wheat annually. Gray is a very ancient town, and was the last place in Franche Comté which submitted to Louis XIV. in 1668.

GRAY, ASA, an American botanist, born in Paris, Oneida co., N. Y., Nov. 18, 1810. He was graduated at the Fairfield medical college in 1831 with the degree of M.D.; but having a greater love for natural science than for the practice of medicine, he abandoned the latter and applied himself to the study of botany. In 1834 he was appointed botanist to the U. S. exploring expedition; but as some time elapsed before it was ready to sail, he resigned that situation. He was afterward appointed professor of botany in the university of Michigan, but before that institution went into operation, he was elected Fisher professor of natural history in Harvard college. From the beginning of his career, his name has been associated with the progress of botanical science in America. His perspicacious mind, retentive memory, and untiring industry have made him not only foremost in America, but one of the leading botanists of the age. In his numerous writings he has shown equal ability in communicating elementary knowledge and in elucidating recondite theory. His elementary works, "Elements of Botany," published in 1836, and especially his later series, "How Plants Grow," "Botany for Young People," "Lessons in Botany" and "Structural and Systematic Botany" (1858), are unsurpassed in the language for precision, simplicity, perspicuity, and comprehensiveness. His labors are recorded in numerous papers contributed to the principal scientific journals and academical memoirs of the day, and in several special works which will ever be the *vade mecum* of American botanists. He came forward at a time when the old artificial systems of botany were giving way before the natural system which took their place. The labors of Michaux, Nuttall, Pursh, and others, extensive as they had been, were to be reconstructed upon new models. The vast botanical wealth of the country was to be recoined with a new die. Dr. Gray, with Dr. John Torrey, was among the first who arranged the heterogeneous assemblage of species upon the natural basis of affinity. At a time when few minds were engaged in exploring the extensive field of American botany, they applied themselves to this work of regeneration, and, while actively engaged in describing the new forms which were pouring in upon them from our gradually increasing territory, they were elaborating the accumu-

lated knowledge of their predecessors which remained in a crude form. In 1838 he commenced, in conjunction with Dr. Torrey, the publication of a "Flora of North America," which was intended to give a thorough and comprehensive history of the botany of the country upon the new basis of affinity. This was continued as far as the end of the order *compositae*; but as the explorations of several collectors were accumulating masses of new material from our western borders, the description of which appeared in several papers published in different journals, the "Flora" was suspended until this constantly increasing wealth of matter could be aggregated under one head. The government expeditions to the Pacific coast also returned laden with botanical treasures, which have been described by Dr. Gray and Dr. Torrey in the government reports. In 1848 Dr. Gray began his "Genera of the Plants of the United States, illustrated by Isaac Sprague," and in the same year, the "Manual of the Botany of the Northern United States," a second edition of which, enlarged and amended, appeared in 1858. In 1854 appeared the first volume of the "Botany of the United States Pacific Exploring Expedition under Capt. Wilkes," a work in which the author has shown himself able to treat of the botany of remote regions with the same critical power that he has applied to the North American flora.

GRAY, HENRY PETERS, an American painter, born in New York, June 23, 1819. He entered the studio of Daniel Huntington in 1838, and in the succeeding year went to Europe, where during a residence of several years he painted his pictures of "Thou art Gone," the "Roman Girl," the "Billet Doux," &c. Returning to New York in 1843, he executed a number of small pictures of *genre* and history; and after another absence abroad in 1845-'6, during which he produced his "Teaching a Child to Pray," "Proserpine and Bacchus," "Cupid begging his Arrows," &c., he established himself in New York, where he has since resided. Among the most important of his remaining works are the "Wages of War," purchased by the New York art union, the "Apple of Discord," "Blessed are the Pure in Heart," an illustration of Irving's "Pride of the Village," "Hagar and the Angel," "Susannah," "Truth," &c. Within the last 20 years he has also executed more than 250 portraits, embracing full lengths, groups, and heads.

GRAY, JOHN EDWARD, an English naturalist, born about the close of the 18th century. For more than 80 years he has been connected with the British museum, over the natural history department of which he now presides. In addition to his labors in arranging the collections of the museum, he has been a voluminous contributor to natural history, particularly to the literature of zoology; and profiting by the advantages which his position has afforded him, he has probably described and classified a larger number of animal forms than any other



naturalist. His papers and memoirs, mostly furnished to the scientific journals, amounted in 1852 to 425, and the number is now probably not far from 500. The most valuable of these are the catalogues of the museum, including those on mollusca, mammalia, and reptiles, in which, beside the lists of animals, he gives much information on the habits, character, and uses of the different species. His writings are comprised under the following heads: the general subject of natural history, the mammalia, birds, reptiles, fishes, articulate animals, the mollusca, and the radiata. His papers on the mammalia and the mollusca in 1852 amounted to considerably over a hundred in each department, those on the latter subject being particularly valuable on account of the extensive and exact information they convey. The most important of them is the "Systematic Arrangement of Molluscous Animals, with Characters of Families." In his conchological studies he has received much assistance from his wife, an accomplished naturalist, and the author of "Figures of Molluscous Animals for the Use of Students," descriptions of which have been given by Mr. Gray. A larger share of his attention, however, has been devoted to herpetology than to any other branch of natural science, and upward of 70 papers describing the structure and habits of species from many parts of the world are included among his writings. In other branches of science he holds a distinguished position, and is now president of the botanical society of London.—His brother, GEORGE ROBERT GRAY, senior assistant in the zoological department of the British museum, is the author of the well known standard work entitled "The Genera of Birds, comprising their Generic Characters" (8 vols. imp. 4to., London, 1837-'49), and of a variety of papers on entomological subjects.

GRAY, THOMAS, an English poet, born in Cornhill, London, Dec. 26, 1716, died July 24, 1771. His grandfather was a considerable merchant of London, who left property which Gray's father, Philip, an indolent, selfish, and unprincipled man, diminished. Philip Gray was a money scrivener, and had some taste and skill in music. The poet, the only one of 12 children who survived infancy, was sent to Eton, where Mr. Antrobus, his mother's brother, was an assistant teacher. From Eton he went in 1734 to Peter House college, Cambridge, where his expenses were borne by his mother from her private earnings, his father refusing to maintain him. At Eton Gray had formed an intimacy with Horace Walpole, son of the minister Sir Robert, and also with Richard West, a son of the lord chancellor of Ireland. With these young friends he early commenced a correspondence, and his letters show how soon his taste matured, and how eagerly he sought knowledge. In 1738 Gray removed from Cambridge to London, without taking a degree, intending to study law; but Walpole having invited him to travel, they set out together for the continent in the spring of 1739. They vis-

ited Paris, Florence, Rome, and Naples, and examined the ruins of Herculaneum, the excavation of which had been commenced the preceding year. Gray spent 11 months at Florence, and there began his Latin poem *De Principiis Cogitandi*. In the summer of 1741 he parted from Walpole in displeasure. Walpole was rich, fond of gay company, and entered into the dissipations of the continent; he imagined that Gray had written home unfavorable accounts of his conduct, and opened one of his letters. He afterward confessed that the fault in the quarrel was his, but Gray had great pride and great reserve, and was too serious a companion for his volatile fellow traveller. He visited Venice, and wrote several Latin odes during his journey, particularly a fine Alcaic ode written in the album of the fathers of the Grand Chartreuse. Having returned with a single servant, he reached London Sept. 1, 1741. His father died two months afterward. He had wasted his fortune in building a country house at Winstead, which was sold for £2,000 less than its cost, and he left his son little. Gray now thought himself too poor to study law, although offered aid by his mother and his aunt, who had long carried on an India warehouse in Cornhill, under the name of Gray and Antrobus, and when the father died had amassed sufficient property for their support. They then gave up their business and went to live with a widowed sister, Mrs. Rogers, at Stoke Poges, in Buckinghamshire. Here Gray frequently visited, and it is said that in the beautiful churchyard of Stoke Poges he conceived the design of his "Elegy;" other churchyards, however, lay claim to the same association. He now became bachelor of the civil law at Cambridge, though he never offered to practise, but continued to live at his university collecting knowledge. He corresponded frequently with West, and communicated to him a portion of a tragedy called "Agrippina," in which Nero, Seneca, and Nero's mother were to be prominent characters. The subject was repulsive, and Gray had no dramatic power; West condemned the manner, and the author abandoned his tragedy. He was always easily affected by discouraging criticism, and had nearly laid aside his "Progress of Poetry" because Mason said he did not think it would take with the public. West, now dying of consumption, wrote frequently to Gray; they exchanged criticisms, complimentary verses, and Latin odes. But the last piece Gray sent, his "Ode to Spring," came back to him with its envelope unopened; his friend was dead (June, 1742). The poet, always reserved and thoughtful, melancholy, and not fond of society, now, by the estrangement of Walpole and the loss of West, grew more than ever depressed. In August of the same year he wrote his "Ode to Adversity" and the ode "On a Distant Prospect of Eton College," both poems expressing unaffected sadness, and both full of beauty and poetic power. About the same time he was

engaged upon his Latin poem *De Principiis*, in which he designed to teach Locke's metaphysics in hexameters. From 1742 he remained at Cambridge, always dissatisfied with the place, and never professing contentment. He wrote in 1747 an ode on the "Death of Mr. Walpole's Cat," having become reconciled to Walpole through a female friend. The next year he began a poem which he never completed, "On Government and Education." It has some fine lines, but the subject is unpoetical. Gray, although of refined tastes and manners, shrank from the society of the great and the gay, living chiefly among scholars. He encouraged Mason, then a young poet, revised his verses, and helped him to an election as fellow of Pembroke hall. Mason became his constant associate, was afterward his biographer, and bore witness to his learning and the kindness of his heart. In 1749 Gray finished the "Elegy written in a Country Churchyard," begun 7 years before, and which first made him known to the public. It originally appeared in the "Magazine of Magazines" in 1752, and achieved an immediate popularity, 4 editions being called for within a year. A visit from Lady Cobham to the author gave rise to his humorous poem, "A Long Story," which he wisely sought to exclude from his published verses. Several of his pieces were printed in 1753 with designs by Mr. Bentley, and, being too few to make a book of the usual size, were printed only on one side of the leaf. The poems and the plates together sold well. This year he lost his mother, to whom he was fondly attached, and whom he never afterward mentioned without a sigh. In 1756, being annoyed by some students who had chambers near him, and who played upon the precise poet some contemptuous pranks, he complained to the governors of the college, and when they neglected his complaint, removed to Pembroke hall. His famous odes, "The Progress of Poetry" and "The Bard," appeared in 1757, and were received with much ridicule. Few professed to understand them, but Gray had on his side Warburton, Garrick, and Walpole, and the public finally learned to admire. His poems were parodied in two odes which not long after appeared on "Obscurity" and "Oblivion." Between the years 1759 and 1762 he occupied lodgings in Southampton row, near the British museum, then just opened, and made diligent use of its materials. His extracts from the Harleian and other collections filled a considerable folio volume. On the death of Cibber the laureateship was offered to him, which he declined. In 1765 he visited Scotland, where he met with many civilities, and was offered by the Marischal college of Aberdeen the degree of LL.D., which he did not accept. He had formerly applied to Lord Bute for the professorship of history at Cambridge, and been refused; in 1768, the occupant of the chair having died, Gray was appointed by the duke of Grafton; he gratefully wrote the ode for the duke's installation as chancellor of the same university the

following year. His professorship added to his income £400, but his health now rapidly declined. In the autumn of 1770 he was able to travel in Wales; he saw Westmoreland and Cumberland, and wrote in correspondence a delightful narrative of his travels. He died of gout in the stomach, and was buried at Stoke Poges in the same tomb with his aunt and his mother.—In appearance Gray was small, delicate, of handsome features, and studiously refined. His manners were nice to effeminacy, his dress carefully adjusted to the fashions of the day. He speaks of himself as a person of great pride and reserve; but he was capable of strong and tender emotion. He could often be satirical, and among his intimate friends his conversation was singularly entertaining and instructive. He spoke little in company, however, and Walpole relates that when upon a visit to Lady Ailesbury he opened his lips but once to say: "Yes, my lady, I believe so." His disposition was more contemplative than melancholy; his sadness was tempered by philosophy. To his great attainments all his friends bear testimony, but he left no public proof of them. He labored uselessly, without distinct purpose, and his knowledge died with him. He was a botanist, a zoologist, an architect, an antiquary, and had a profound knowledge of heraldry. He had read all the Greek classics, and planned an edition of Strabo. He was familiar with all history, was learned in art, had studied the schools of philosophy, and wrote better Latin verse than any of his contemporaries. But of all this learning there came only a few poems and some agreeable correspondence. Gray adorns thought with rich drapery, and covers it with profuse coloring. His "Elegy," the culmination of his genius, bears more than any other short piece in the language the impress of immortality. Almost every line has fixed itself upon the popular mind, is repeated every year and every day by the cultivated and the unlearned, and has a vital truthfulness that is never old. Upon no poem of so brief an extent has so much labor been bestowed. Among the best of the numerous editions of Gray's poems are those by W. Mason, with his letters and a memoir (4 vols. 8vo., York, 1778); and by the Rev. John Mitford, with notes and a memoir (8vo., London, 1814), several times republished. An edition of his complete works, with Mason's memoir, was issued by T. J. Mathias (2 vols. 4to., London, 1814). Mr. Mitford also published in 1853 Gray's correspondence with Mason, from which it appears that the poet's letters were mutilated by Mason in his edition.

GRAYDON, ALEXANDER, an American author, born in Bristol, Penn., April 10, 1752, died in Philadelphia, May 2, 1818. He was educated at Philadelphia, having John Beveredge for his preceptor, and had begun to study law when in 1775 he joined the colonial forces as captain, and traversed his state for recruits. After having carried a supply of money to the troops under the command of Gen. Schuyler at

Lake George, he joined the army at New York, and was taken a prisoner in the action on Harlem heights. He was confined in New York and at Flatbush, was afterward liberated on parole, passed through the American camp at Morris-town, and was fully released by exchange in 1778. He held the prothonotaryship of Dauphin co., and resided in Harrisburg from 1785 to 1799, when he removed to a farm near that city, from which he returned to Philadelphia in 1816. He published in 1811 his "Memoirs of a Life, chiefly passed in Pennsylvania, within the last Sixty Years," an entertaining and well written work, illustrative of revolutionary manners and history. It was republished in Edinburgh (1822) under the care of the novelist John Galt, and in Philadelphia (1846) with annotations by J. S. Littell. In 1818 and 1814 Graydon contributed to the "Portfolio" of Philadelphia a series of papers entitled "Notes of a Desultory Reader."

GRAYLING, a soft-rayed fish, of the salmon family, and genus *thymallus* (Cuv.), found in the rivers of northern Europe, Asia, and America. The English grayling has the head and body elongated, the former pointed and flattened on the top; 2 dorsals, the 1st much longer than it is high and with numerous rays, the 2d small, adipose, and rayless; the mouth small; the teeth numerous, conical, small, in a single series on the jaws and anterior part of the vomer, none on the tongue; the scales rather large, and the lateral line not very conspicuous; the air bladder is capacious, and communicates with the gullet by a very small tube; the caudal is forked; branchiostegal rays 7 or 8. It is a very handsome and lively fish, though less active than the trout; the general color is a light yellowish brown, with reflections of golden, copper, green, and blue, and some dark spots; the head brown, and the fins darker than the body; the dorsal fin is varied with square dusky spots; the colors grow darker by age, and in dark waters; the iris is golden yellow, and the pupil blue. This is probably the *T. vulgaris* (Nilss.), found in a few of the rivers of England, in restricted localities, in Sweden, Norway, and Lapland, but probably not in Ireland or Scotland. It prefers rivers with rocky and gravelly bottom, with alternate stream and pool; it swims deeper than the trout, and feeds on flies and aquatic larvæ, especially on those which construct cases (like the May flies), and on small shells and crustaceans. It is an excellent fish for the table, is in the finest condition in October and November, and should be dressed soon after being taken; it rises to the fly, but less readily than the trout; from the size of its dorsal it cannot stem rapid currents nor leap falls; the generic name was given from an alleged resemblance of the odor of its flesh to that of thyme; from its color and odor St. Ambrose is said to have called it the "flower of fishes." Unlike other *salmonida*, it spawns in April or May; the average length is 10 or 12 inches, with a weight of about 1½ lbs., but they have been taken weighing 4½ lbs.

For a full and interesting account of the habits and history of this fish, the reader is referred to the 7th "Conversation" in "Salmonia," by Sir Humphry Davy. Other species are the *T. oxiliffæ* (Ag.), from the rivers of France and the Swiss lakes and streams; the naked-throated grayling (*T. gymnothorax*, Val.), in which the parts beneath the throat are destitute of scales, found in Prussia and Russia, and supposed by Valenciennes to be the common grayling of Bloch and Cuvier; the naked-bellied grayling (*T. gymnogaster*, Val.), from Russia, in which the abdomen far beyond the pectorals is without scales; *Ælian's* grayling (*T. Æliani*, Val.), from Italy, supposed to be the species described by this Greek naturalist; Pallas's grayling (*T. Pallasii*, Val.), from Russia, characterized by the great elevation of the dorsal; Merten's grayling (*T. Mertensii*, Val.), from Kamtschatka, remarkable for its small head and short anal and pectorals. The grayling is called *ombre* in French and *Aesche* in German, probably from its prevailing ashy gray color in the water. In America, this fish has been found in the cold clear waters of Great Bear and Winter lakes, and in streams emptying into the Mackenzie river. Back's grayling (*T. signifer*, Rich.) has not been discovered south of lat. 62° N.; this is a large species, about 17 inches long, and highly esteemed by the Esquimaux and the *voyageurs*. Valenciennes, who describes all the above species, gives one from Lake Ontario (*T. ontariensis*, Val.) resembling the *T. gymnothorax*.

GRAYSON. I. A S. W. co. of Va., bounded S. by N. Carolina, S. E. by the Great Kanawha (here called New) river, and N. W. by the Iron mountain; area, 340 sq. m.; pop. in 1850, 6,677, of whom 499 were slaves. The county is well adapted for grazing, and iron ore is abundant. The productions in 1850 were 177,266 bushels of Indian corn, 110,770 of oats, 17,127 of wheat, 88,707 lbs. of butter, 23,169 of wool, and 3,523 tons of hay. There were 30 corn and flour mills, 16 saw mills, 21 churches, and 217 pupils attending public schools. Organized in 1793. Value of real estate in 1850, \$570,528; in 1856, \$1,002,146, showing an increase of 75 per cent. Capital, Independence. II. A N. co. of Texas, separated by Red river from the Indian territory; area, 950 sq. m.; pop. in 1858, 5,711, of whom 797 were slaves. The surface is undulating and partly covered with forests of oak, ash, and elm. The soil is a dark, fertile loam, suitable for various kinds of fruit, grain, cotton, and pasturage. The productions in 1850 were 59,015 bushels of Indian corn, 5 bales of cotton, and 55,245 lbs. of butter. Value of real estate in 1858, \$1,031,380. Capital, Sherman. III. A central co. of Ky., bounded N. by Rough creek, and drained by several affluents of Green river; area, about 700 sq. m.; pop. in 1850, 6,887, of whom 320 were slaves. The surface is level or undulating, and the soil moderately fertile. Anthracite and carboniferous limestone are found in abundance, and there are several

white sulphur springs. The productions in 1850 were 314,260 bushels of Indian corn, 78,275 of oats, 248,227 lbs. of tobacco, and 15,096 of wool. There were 5 corn and flour mills, 4 saw mills, 3 tanneries, 9 churches, and 522 pupils attending public schools. Value of real estate in 1855, \$465,932. Organized in 1810, and named in honor of Col. Wm. Grayson, U. S. senator from Kentucky. Capital, Litchfield.

GRAYSON, WILLIAM J., an American politician and poet, born in Beaufort, S. C., in Nov. 1788. He was graduated at the South Carolina college in 1809, elected to the state legislature in 1813, and subsequently admitted to the bar at Charleston. He was elected to the senate of the state in 1831, and in the exciting controversy on the subject of the tariff maintained that the reserved rights of the state gave it power to determine when its grants to the federal government had been violated, and to arrest such violations within its own limits, but was not disposed to push the collision to the extreme of civil war. He was a representative in congress from 1833 to 1837, and in 1841 was appointed collector of the port of Charleston by President Tyler, an office which he retained under President Polk. During the secession agitation in 1860 he published a "Letter to Governor Seabrook," deprecating disunion, and pointing out the evils which would follow it. Mr. Grayson is known also for his literary ability and tastes, and has occasionally contributed to the "Southern Review" and other periodicals. In 1854 he published "The Hiring and the Slave, a Didactic Poem," comparing the condition of the negro slave in the South with that of the pauper laborer in Europe, and containing fine idyllic descriptions. He has also published "Chicora," an Indian tale, in octosyllabic verse, a poem entitled the "Country," and is supposed to be the author of a narrative poem entitled "Marion," embodying the military career of that patriot.

GRAYWACKE, or GRAUWACKE (Germ. *grau*, gray, and *Wacke*, a stone composed of quartz, sand, and mica), a name given by German miners to a silurian sandstone made up of quartz pebbles cemented together. Early adopted by geologists, it was indiscriminately applied to similar rocks of any period, generally conveying the impression of their being of the same ancient date. The term is not now in use.

GREAT BARRINGTON, a post village and town of Berkshire co., Mass., on the Housatonic river and railroad, 45 m. N. W. of Springfield, and 134 m. W. of Boston; pop. in 1855, 3,449. It is pleasantly situated, watered by a number of good mill streams, and surrounded by beautiful hills. It contains beds of iron ore and quarries of fine variegated marble. It has 6 churches (2 Congregational, 2 Episcopal, 1 Methodist, and 1 Roman Catholic), a newspaper office, a bank, an academy, and gas works, and in 1855 contained a cotton mill, manufacturing about 350,000 yards of cloth per annum, a woollen mill, manufacturing 500,000 yards of

cassimere per annum, a furnace, a cordage factory, 2 flour mills, a tannery, a distillery, a shingle mill, and a manufactory of India rubber goods. It anciently bore the name of Houssatonnock, and from 1761 to 1787 was the seat of the county courts.

GREAT BRITAIN, in a geographical sense, the largest and most important island of Europe, and in a political sense, as popularly used, the British empire, or the United Kingdom of Great Britain and Ireland. Britain (Britannia) was the ancient name of the island, by which it was known to the Romans. The western peninsular projection of France, called by the Romans Armorica, was occupied by the same race that constituted the aboriginal population of Britain. As early as the 6th century of our era, the French applied the term Bretagne (Britain) to Armorica, and to distinguish the continental from the insular Britain, called the former "Little Britain" and the latter "Great Britain." The term Great Britain, however, was little used by the islanders themselves until the accession of James I. to the crown of England in 1603 united the whole island under one sovereign. By the legislative union between England and Scotland, May 1, 1707, Great Britain became the legal name of the kingdom. The island comprises England, Wales, and Scotland. Scotland is frequently termed North Britain. The official style of the empire is "The United Kingdom of Great Britain and Ireland," but in current language the term Great Britain includes politically the British and Irish kingdoms, and is the common designation of the whole imperial power. (See BRITISH EMPIRE, ENGLAND, IRELAND, SCOTLAND, and WALES.)

GREAT KANAWHA, or KANAWHA RIVER, a large stream of North Carolina and Virginia, called in the upper part of its course New river. It rises in the N. W. part of the former state, in the valley between the Blue Ridge and Iron mountain, and flows N. E. to the N. part of Grayson co., Va., where it passes through a defile in the Iron mountain, and, bending toward the N. W., breaks through Walker's, Peter's, and Greenbrier ridges of the Alleghanes. After receiving Gauley river in Fayette co., it takes the name of Great Kanawha, passes through the coal and salt region, and joins the Ohio at Point Pleasant. Its length is about 400 m., and its width 66 m. above its mouth is 450 feet, and at the junction of Gauley river, 100 m. above its mouth, 1,500 feet. It is navigable at all seasons to a point about 2 m. below the Gauley, where the river has a picturesque fall of 50 feet perpendicularly. Its principal affluents are the Greenbrier, Gauley, and Elk on the N., and Coal river on the S. The principal towns on its banks are Greensville, Parisburg, Fayetteville, Charleston, Putnam, and Point Pleasant.

GREAT SALT LAKE, an extensive sheet of water in Utah, the principal island in which is in lat. 41° 10' 42" N., and long. 112° 21' 5" W. It lies in a basin or valley of the Rocky

mountains, about 120 m. in length from N. to S., and 80 or 40 m. in breadth from E. to W. The lake itself is 75 m. long from N. to S. and about 80 m. broad. Its surface is 4,200 feet above the level of the sea. It has no outlet. The water is shallow, the depth in many extensive parts being not more than 2 or 3 feet. At the distance of 85 m. S. lies Utah lake, a body of fresh water 85 m. long and 100 feet above the level of Great Salt lake, into which it flows through a strait or river called the Jordan. Utah lake abounds with fish. Bear river flows into the Great Salt lake from the N., and several smaller rivers from the Timpanagos mountains on the east. The floods of spring spread the lake over large tracts, from which it recedes as the summer advances. At some former period it was evidently vastly more extensive than at present, and formed an inland sea spreading for hundreds of miles. The country around it is mostly desolate and barren, though there are portions which irrigation would render very fertile. The water is clear and transparent, but excessively salt; it contains about 22 per cent. of chloride of sodium, slightly mixed with other salts, and forms one of the purest and most concentrated brines known in the world. No living thing whatever has been found in it, though immense flocks of gulls, wild ducks, geese, and swans frequent its shores and islands. The water is very buoyant, so that a man may float in it stretched at full length upon his back, having his head and neck, with his legs to the knee, and both arms to the elbow, entirely out of water. If he assumes a sitting position, with the arms extended, his shoulders will rise above the water. Swimming, however, is difficult from the tendency of the lower extremities to rise above the surface; and the brine is so strong that it cannot be swallowed without danger of strangulation, while a particle of it in the eye causes intense pain. A bath in this water is refreshing and invigorating, though the body requires to be washed afterward in fresh water to remove the salt. The first mention of the Great Salt lake was by the baron La Hontan in 1689, who gathered from the Indians west of the Mississippi some vague notions of its existence. Its dimensions, until within a few years, were greatly exaggerated on our maps, in which it bore the name of Lake Timpanagos, and it was supposed to have an outlet into the Pacific. It was explored and described in 1843 by Col. Fremont, who was the first to navigate its waters. A thorough survey was made in 1849-50 by Capt. Howard Stansbury of the U. S. army, whose report of "An Expedition to the Valley of the Great Salt Lake" was printed at Washington by order of congress in 1852. Another edition was published at Philadelphia in 1855. "The City of the Great Salt Lake," commonly called Salt Lake City, is situated on the strait that connects Lake Utah with the Great Salt lake, about 20 m. S. of the latter. (See SALT LAKE CITY.)

**GREAT SLAVE LAKE** (Fr. *Lac des Esclaves*), a large irregular sheet of water in a district of the same name in Hudson's Bay territory, British North America, lat.  $60^{\circ} 40'$  to  $63^{\circ}$  N., long.  $109^{\circ} 30'$  to  $117^{\circ} 30'$  W.; length from E. to W. 300 m.; greatest breadth 50 m. Its N. shores are steep and rough, and from them it receives the outlets of Aymer and Artillery lakes. On the S. it presents a less rugged bank, and is entered by the river of its own name. It contains a number of islands, some of which are well wooded, and for half the year is wholly frozen over. Mackenzie river conveys its surplus waters to the Arctic ocean.

**GREAT SLAVE RIVER**, of British North America, is formed by the union of Peace and Strong rivers, the latter of which is the outlet of Lake Athabasca. The upper part of its course is obstructed by falls and rapids, after which it flows N. through an alluvial district, and enters Great Slave lake by 2 months near Fort Resolution. Length, about 300 m.

**GREAVES, JOHN**, an English mathematician and antiquary, born in Colmore, Hampshire, in 1602, died in London in 1652. He was educated at Oxford, and in 1680 was chosen geometrical lecturer in Gresham college, London. After visiting Holland, France, and Italy, he embarked in 1687 for Constantinople, whence he proceeded to Egypt, and in 1640 returned to England, bringing with him several Arabic, Persian, and Greek MSS., and a large collection of gems, coins, &c. Soon after his return he was appointed Savilian professor of astronomy at Oxford. In 1648, having been ejected from Oxford on account of his royalism, he settled in London.

**GREBE**, a lobe-footed bird of the family *Columbida*, and sub-family *podicipina*, comprising the genera *podiceps* (Lath.) and *podilymbus* (Lesson). The genus *podiceps* is characterized by a long, straight, and slender bill, with the culmen slightly curved at the tip, which is sharp and entire, the sides compressed, and the nostrils longitudinal and in a short groove; the wings short and pointed, the 1st and 2d quills the longest and slightly emarginated near the tips; tail short, a mere tuft of loose feathers; tarsi shorter than the middle toe, much compressed, covered with scales serrated posteriorly; toes long, lobed on the sides and united by webs at the base; hind toe short and broadly lobed; nails short, broad, flat, and obtuse. There are more than 20 species described in all parts of the world; they are usually seen in small flocks on the shores of fresh water lakes and rivers and near the sea coast, and rarely on land, as the posterior position of the legs renders it very difficult for them to walk; they are excellent swimmers and expert divers, flying under water to a considerable depth in pursuit of fish; they are generally short and rapid flyers, but during their migrations the flight is elevated and long sustained; when alarmed, they hide among the reeds, or sink under water, leaving only the bill out, till the danger is over.

The food consists of fish and aquatic animals and plants; the nest is made of grasses, lined with down, attached to the reeds or floating; the eggs are 3 or 4 in number. The American species vary much in size; one of the largest is the crested grebe (*P. cristatus*, Linn.), 24 inches long, with an extent of wing of 83; the adult male has a blackish brown bill, about 2½ inches long; upper part of head and crest, nape and upper plumage, blackish brown; the ruff, which birds of this genus have in the breeding season, is reddish brown ending in black; cheeks, throat, band before eye, humeral feathers, and secondaries, white; fore part and sides of neck reddish brown; rest of under parts silvery white; primaries dark brown; iris bright carmine; in the females and young, the crest is very slight, and the upper parts are tinged with gray. It is found along the Atlantic coast from the fur countries, where it breeds, southward and as far as Texas in the winter, and also on the Pacific shore. All the species have the head rather small, the eyes near the bill, the neck long and slender, and the body flattened; the plumage is thick and soft, and silky on the under surface. The red-necked grebe (*P. griest-gena*, Bodd) is 18 inches long, with a black bill, paler at the end; the general color of the upper plumage is blackish brown, black on the nape, cheeks and throat ash gray, fore part and sides of the neck brownish red, sides dusky, and below white. This is found from the fur countries as far south as Pennsylvania in the winter; it is a stouter bird with shorter neck, and smaller crest and ruff, than the preceding species. The largest known species is the western grebe (*P. occidentalis*, Lawrence), 29 inches long, with an extent of wings of 3 feet; it inhabits the Pacific coast from Washington territory to California. The horned grebe (*P. cornutus*, Gmel.) is about 14 inches long; the sides of the head are tufted, and of a yellowish red color; the feathers of the upper parts are margined with gray; throat glossy black; fore neck and upper breast chestnut red; lower parts shining white. It is very generally distributed over North America; it is known to gunners as the "hell diver," from its activity in diving; like that of all the grebes, the flesh has a strong fishy flavor, and is rarely eaten except by the north-west Indians, who also make under garments of the soft plumage of the lower parts. Three other species are described by Baird.—In the genus *podilymbus* the bill is shorter than the head, strong, with the culmen much arched to the tip, which is hooked over the lower mandible; there are no ornamental ruffs. Only 2 species are described, one in North and the other in South America, generally distributed over the temperate regions, preferring fresh water. The pied-bill grebe, or dobchick (*P. podiceps*, Linn.; *P. carolinensis*, Lath.), is 14 inches long, with a pale blue bill crossed by a black band; the upper plumage very dark brown; chin and throat with a black patch; cheeks, sides of neck, and abdomen, grayish

white; upper breast and sides rusty brown; the female has not the black patches. The other and South American species is the *P. brevivestris* (Gray).

GREECE. The country called Græcia by the Romans was denominated Hellas by the inhabitants in the historical times, and the Greeks (Græci) were known as Hellenes. According to Aristotle, the most ancient Hellas included only the region about Dodona and along the Achelous, a part of whose inhabitants were called Græci (Γραικοί), from Græcus (Γραικος), who, according to tradition, was a son of Theseus. The name appears to have spread among the inhabitants of the N. W. coast, who were connected with the early inhabitants of Italy, and thus to have come to the Romans as that of the whole country and the people; and the modern nations of Europe have adopted it from the Romans. The Greeks themselves, however, on the establishment of their independence, and the organization of the new kingdom under Otho, in 1838, reclaimed the ancient name of Hellas.—The south of Europe is divided into three large and beautiful peninsulas, the most eastern of which includes Greece. It takes the form of a triangle, the base of which consists of the mountain range of Hæmus, Scymus, and the Illyrian Alps, running from the Euxine to the Adriatic. Greece proper, however, did not embrace Illyria, Macedonia, and Thrace. It began at lat. 40° N., where it was bounded by a chain of mountains extending from the Thermaic gulf on the east, and terminating with the Acroceraunian promontory on the Adriatic, in the west. This chain includes Mt. Olympus, the Cambunian mountains, and Mt. Lingon. On the north lay Macedonia and Illyria. Greece extends southward to lat. 36°. Its greatest length, from Mt. Olympus to Cape Tænarus, is about 250 m.; its greatest breadth, from the W. coast of Acarnania to Marathon, the most easterly point of Attica, is about 180 m.; and its surface, exclusive of Epirus, and including the large island of Eubœa, is about 21,151 sq. m., viz.: Thessaly, 5,674; the central provinces, 6,288; Eubœa, 1,410; Peloponnesus, 7,779. S. E. of Greece, in the Ægean sea, lay a beautiful group of islands called the Cyclades, because they lay around Delos, the smallest, but the most important and most famous. Along the coasts of Attica and Boeotia stretched the island of Eubœa, 90 m. in length. E. of the Cyclades, and along the Asiatic coast, extended the Sporades. The islands of Crete and Rhodes lay further S. in the Mediterranean sea. Between Attica and Argolis in the Saronic gulf, were Salamis, Pyttaleia, and Ægina. Along the W. coast of Greece, in the Ionian sea, extended Corcyra, Cephallenia, Ithaca, Zacynthus, and several smaller islands, and Cythera, at the S. extremity of Laconia. These are now known as the Ionian islands. The chain of mountains forming the N. boundary of Greece is intersected nearly at right angles by the range of Pindus, which formed the boundary between Thessaly and Epirus. A lateral branch

of Pindus, called Othrys, is the S. boundary of the fertile plain of Thessaly. South of Olympus, along the E. coast, and parallel with Pindus, runs the chain of Ossa and Pelion, broken only by the vale of Tempe and the river Peneus. Epirus is a mountainous country, but between the ranges running N. and S. flows the Achelous, the largest river in Greece, emptying into the Corinthian gulf. Thessaly and Epirus are connected with central Greece by a broad isthmus between the Ambracian gulf on the W. and the Malian gulf on the E. Central Greece includes Doris, Phocis, Locris, Bœotia, Attica, and Megaris, in its E. part, and Ozolian Locris, Ætolia, and Acarnania, in its W. division. A branch from the higher summit of Pindus, called Tymphrestus, running S. E., and bearing the name of Ceta, forms the N. barrier of central Greece. It extends nearly to the Malian gulf and the sea, leaving only the narrow pass of Thermopylæ as an entrance into central Greece from the north. Further S. the Pindus divides into two branches, one stretching S. E. and bearing the immortal names of Parnassus, Helicon, Cithæron, and Hymettus, terminating at Sunium; the other taking a S. W. direction, and having the names of Corax and the Ozolian mountains, and striking the W. end of the Corinthian gulf. Between Ceta and Parnassus lies the little plain of Doris, the original seat of the Dorians. Phocis lies about Parnassus. South-east from the extremity of Ceta a chain of mountains runs along the coast through the country of the Epionemidian and Opuntian Locrians; and S. of this territory, separated from the Euripus or channel of Eubœa by the continuation of the Locrian mountains, extends the rich and fertile Bœotia, having on the S. W. the range of Helicon, which separates it from the Corinthian gulf; on the N. a narrow opening between the spurs of Parnassus and the Locrian mountains gives a passage to the Bœotian Cephissus; on the S. it is separated from Attica by the barriers of Cithæron and Parnes. Megaris is a mountainous region, descending to the Saronic gulf W. of Attica and E. of Corinth. Attica, in the form of a triangle, extends from Cithæron and Parnes, which form the base on the N., to Sunium on the S., which forms the apex. The peninsula of Peloponnesus is connected with central Greece by the isthmus of Corinth, which separates the Corinthian from the Saronic gulf, by the width of only about 5 miles at the narrowest part. It consists of an elevated central region called Arcadia, surrounded by mountains, which branch off in different directions toward the sea, and form the dividing lines which bound the provinces of Achaia, Argolis, Laconia, Messenia, and Elis. These are the principal geographical features of Greece. The traveller in that country is surprised at its mountainous aspect, and cannot fail to observe the peculiar manner in which the chains divide its surface into small irregular plains, furnishing a physical reason for the numerous separate states into which its population was

distributed. The height of the principal mountains is very great in proportion to the extent of the country. Olympus is 9,700 feet above the sea; Parnassus, 8,000; Cyllene in Arcadia, 7,788. The coast line of Greece is broken by numerous bays and harbors, and is of greater proportional length than that of any other continental country in the world. The beauty and variety of the scenery are unequalled. The forms of the mountains are picturesque, and the atmosphere is indescribably lovely. The climate is generally temperate, but diversified according to the elevation of the surface above the sea. In general, it is healthy and favorable to long life, as shown by the great number of persons in antiquity who lived and retained their faculties to a very advanced age; and among the present population of Greece, numerous instances of longevity furnish similar proof.—Such was the country, small in space, but wonderful in its physical advantages, in which the marvellous history of the Hellenes or Greeks was destined to be enacted. The early periods of their history are covered with the veil of fable. The Greeks belong to the great Indo-European race, who from the earliest times have been the conquerors and civilizers of the world. Ancient traditions and facts of comparative philology point to a primeval connection between the inhabitants of the central regions of Asia—the region of Iran, and the extensive countries of the Indus and the Ganges—and the early inhabitants of Greece and Italy. Whether the first emigrants from Asia found in Greece aboriginal tribes whom they subdued or with whom they united, or whether they found the land unoccupied, there are no means at present of deciding. But the earliest authentic traditions represent the new comers as arriving among autochthonous populations, and bringing with them religion and the arts from their primeval home. Yet the Greeks were fond of tracing their origin back to a common ancestor, Hellen, the son of Deucalion and Pyrrha, the survivors of the deluge; and the great divisions of the race, the Dorians, Æolians, Ionians, and Achæans, claimed to be descended from Dorus and Æolus, sons of Hellen, and Ion and Achæus, sons of Xuthus the third son of Hellen. According to the popular belief, Æolus succeeded Hellen as king of Hellas in Thessaly, and his descendants spread over central Greece as far as the isthmus of Corinth, and occupied the W. coast of Peloponnesus. The Dorians were confined to Doris, between Thessaly and Phocis; the Ionians occupied Attica and the north of Peloponnesus; the Achæans in the heroic age occupied Mycenæ, Argos, and Sparta, in Peloponnesus, and the original abode of the Hellenes in Thessaly. In the historical times the Dorians and Ionians, represented by the Spartans and Athenians, became the leading races in Greece. The first inhabitants of Greece were called Pelasgians by the Greeks themselves, and were considered by them as a different race from the Hellenes, with a different language. In historical times, those parts of

Greece which had been the least disturbed by revolution and conquest were supposed to have retained the most of the original Pelasgian element. Whether the Pelasgians themselves came in from Asia, at a period beyond the reach of tradition, cannot be satisfactorily determined. The most consistent and intelligible hypothesis is that which considers the Pelasgic populations as representing the body of the primitive inhabitants of Greece, and as having formed the basis of the subsequent nationalities. We may consider the Hellenic as representing the later and more civilized accessions, which, blending with the Pelasgic, developed that peculiar type of intellectual character which distinguished the Greek from every other ancient race, and which bound together all its varieties into one great Hellenic unity. It was believed that Egyptian and Phœnician immigrants, arriving at a very early period, and bringing with them arts, culture, and religious rites, from countries whose civilization had come down from an immeasurable antiquity, contributed largely to this result. Thus Cecrops brought civilization from Sais in Egypt to Athens; and the name of Cecropia, borne by the Athenian Acropolis, commemorated the tradition. Argos was founded by Danaus, who fled from Egypt with his 50 daughters, to escape the persecutions of the 50 sons of Ægyptus. Pelops led a colony from Asia Minor, and gave the name of Peloponnesus to the S. peninsula. Cadmus came from Phœnicia to Thebes, and introduced the Phœnician art of writing. It is quite possible that all these legends may have their origin in historical facts. It is certain that there was a frequent intercourse by sea, in the earlier periods, between the Greeks and Phœnicians; and the Greek alphabet, whenever introduced, is unquestionably of Phœnician origin. The heroic age of Greece is the legendary period in which flourished a race of men generally supposed to be descended from the gods, and are called by the name of heroes, a term implying the possession of a nature superior to that of common mortals, as Hercules, Theseus, and Minos. In this period were placed by the poets a series of expeditions and exploits, famous in the literature of Greece, as the voyage of the Argonauts in search of the golden fleece, the war of the 7 chiefs against Thebes, the war of the Epigoni, and, last and most famous of all, the siege and capture of Troy, and the return of the heroes, which form the conclusion of the heroic age. Here, too, we may reasonably suppose that historical facts furnished the germ of the legends; but as the whole treatment of them is poetical, it is impossible to separate fact from fiction with any certainty or even probability. The poems of Homer contain all we know of the manners and society of the heroic age; but the date of these poems cannot be fixed with any precision, and even the nature, origin, and character of the compositions themselves have been the subjects of doubt and dispute. We may receive, however, the general delineations of the heroic society,

in the Homeric poems, as representing substantially what was believed by the Greeks themselves, in the period following the heroic age. We may suppose, without any great stretch of credulity, that Greece was divided into numerous kingdoms, governed by hereditary chieftains; that frequent wars occurred between the leaders of these communities; and even that hostilities broke out from time to time between the inhabitants of the opposite shores of the Ægean sea, and that confederacies were formed to wage distant wars, in revenge for wrongs endured, or for purposes of plunder. To this extent the war of Troy may have had, probably did have, a historical basis, and the leading heroes may have been historical characters, whose deeds were magnified by tradition, and embellished by the songs of the bards. Among the later legends are those of the migrations of the Bœotians from Thessaly into the country called from them Bœotia, said to have taken place 60 years after the fall of Troy; and the conquest of Peloponnesus by the Dorians, placed 20 years later. They were said to have been led by the descendants of Hercules, who claimed the possession of the country as an ancestral right. This enterprise gave rise to the Dorian states of Peloponnesus, and is known in history under the name of the return of the Heraclidæ. The establishment of Greek colonies in Asia Minor belongs to the period following the Trojan war. The migrations appear to have continued through several ages, and were, partly at least, owing to movements and disturbances among the populations of Greece. In the course of time, Greek colonies were spread over the whole W. coast of Asia Minor, and numerous cities were founded. The N. portion of the coast, with the islands of Tenedos and Lesbos, was occupied by the Æolians; the Ionians took the central part, with the islands of Chios, Samos, and the Cyclades; while the S. W. corner, with the islands of Rhodes and Cos, was settled by the Dorians. The Æolian migration was the earliest, but the Ionian was the most important. There were 11 Æolian cities in historical times. The Ionians formed 12 states, united by the worship of Poseidon at the Pan-Ionic festival. The Dorians had 6 colonies, which formed the confederation of the Doric Hexapolia. We have no trustworthy chronology for whatever of historical events may form the basis of these traditions; but there can be no question of the facts of such migrations having taken place, and we may assume the date of about 1000 B. C. as closing the period within which these movements occurred. The authentic history and chronology of Greece commences between 2 and 3 centuries later, with the beginning of the Olympiads, 776 B. C. Greek history during this interval is almost a blank. We find Greece divided into a number of small states, under separate governments, united into confederacies for permanent or occasional objects, but with no central government to control the whole. The Grecian world was bound together



by language, blood, common religious rites and festivals, social institutions and laws, which distinguished them broadly from the barbarian nations and races surrounding them. The language was divided into dialects, but with sufficient resemblance to each other to be easily understood by all. In the religious systems, particular deities were specially worshipped by particular tribes and at particular places, but the general principles were everywhere the same. They constituted a Hellenic mythology, having its analogies with other mythologies, but in very essential points distinguished from them. Religious rites were periodically celebrated, at festivals in which associations of neighboring states participated, under the general name of amphictyonies, or at the great national games. The amphictyonic council, held alternately at Delphi and at Thermopylae, was partly political and partly religious. The Olympic, Pythian, Nemean, and Isthmian festivals tended strongly to keep alive the sentiment of Hellenic unity. The establishment of oracles, enjoying authority over the Hellenic world, was another bond of union. The oracle of Zeus at Dodona, of Apollo at Delphi, of Amphiaraus at Oropos, of Apollo at Delos, though not of equal antiquity or influence, yet during the historical ages were regarded with general reverence, not only in Greece, but among foreign nations. Notwithstanding these bonds of union, the several states of Greece could never be brought into a voluntary political union under a government having the right and power to interfere with the cherished autonomy or self-government of each individual state. Excepting in great crises of their history, such as, in the legendary times, the Trojan war, and in historical times the Persian invasion, their patriotism was local, and they never acted for a common object. Indeed, they had no common designation, as Thucydides truly remarks, until gradually the name of the Hellenes supplanted the rest.—In the early historical times the Dorians had become masters of the E. and S. parts of Peloponnesus by invasion and conquest from the north. At the beginning of the Olympiads, Sparta, afterward the leading Doric state, was of inconsiderable importance, and her territory hardly more than the valley of the Eurotas; but the military and civil institutions of Sparta, as established by the constitution of Lycurgus, gradually raised their state to a foremost place among the commonwealths of Greece. The date of the Spartan lawgiver is doubtful, and even his existence has been reduced by the scepticism of modern times to a myth. But there seems no reasonable ground for denying the reality of his existence, and the substantial truth of the ancient accounts of his legislation; and he has been approximately placed at the beginning of the era of the Olympiads. His ordinances, called *rhētrai*, wrought great changes in the constitution of society, and produced results that acted powerfully on the course of Greek history. The

powers of government were distributed between two kings of Heraclidan descent, a senate (*γερουσία*) of 80 members, a popular assembly, and a body of 5 *ephoroi*, or overseers. The senators were elected for life, and the ephori annually. The education of the children and the discipline of the citizens were the most remarkable features in the legislation of Lycurgus. The leading principle was that the individual belonged to the state, and all his interests, life itself, were subordinate to the public welfare. From the age of 7 the child was wholly under the control of the state; all his training aimed to form a hardy soldier. Literature and art, except so far as they could be directly serviceable to this grand result, were despised. Homer and Tyrtaeus were valued only for their martial spirit, while Archilochus was proscribed because he confessed that he was guilty of the highest offence known to the Spartan ethics—flight from the field of battle. Spartan women were trained up with almost equal rigor. Household duties were not enforced as their special functions, but they were educated to be the mothers of a vigorous race of citizens. "The Spartan women alone," said the wife of Leonidas, "bring forth men." When their husbands and sons went forth to battle, as the women handed them their shields, "Either with this, or upon it," was the laconic exhortation they received. Sparta became the mistress of the greater part of Peloponnesus by subduing the Messenians, Arcadians, and Argives. The two wars against the Messenians were the most important and obstinate; they have also a special literary interest, on account of the poems of Tyrtaeus. The first Messenian war grew out of private quarrels. It occurred about 748 B. C., and, having lasted about 20 years, ended with the complete subjection of the Messenians, who were compelled to abandon their country, and were reduced to the condition of helots or slaves. About 88 years later, 668 B. C., the Messenians, under the lead of the heroic Aristomenes, took up arms, and were supported by the Argives, Arcadians, Sicyonians, and Pisatans; while the Corinthians lent aid to Sparta. At first the fortunes of war were adverse to the Spartans; but the martial strains of Tyrtaeus revived their drooping spirits, and though after this they suffered several bloody defeats from Aristomenes, they persevered until the Messenians became a second time the serfs of the Spartans, 668 B. C. In the course of the following century the Spartans extended their conquests over the greater part of Arcadia, and annexed the large Argive territory of Cinuria. In the middle of the 6th century B. C., Sparta had become the most powerful of the states of Greece. She was distinguished politically from the others by retaining the form of a royal government, royalty having been elsewhere abolished at an early period of the Olympic era. In some of the states the king became an archon for life; in others the royal house was set aside, and one of the nobles selected, under the title of

*prytanis*, or president, and holding office for a limited time. This was substantially a change from monarchy to oligarchy, since the powers of government were limited to the members of the old nobility, who possessed the greater part of the land. These oligarchies were overthrown in many of the Greek states by the rise to power of able and ambitious men, called by the Greeks tyrants. The early significance of this word was limited to the irregular methods by which power was attained, and not extended to the severity with which it was administered. Though the actual government of the tyrants was oppressive for the most part, yet some of them were among the wisest men and the best rulers of the Greeks. The period of the tyrannies was about 150 years, from 650 to 500. The most celebrated of them were the tyrants of Sicily, whose rule lasted 100 years, ending with Olisthenes, 560; those of Corinth, beginning with Cypselus, including the great Perianther, and ending with Psammetichus, about 581; and Theagenes, tyrant of Megara. A similar political condition prevailed in most of the other Grecian states in the 7th and 6th centuries before the Christian era. The history of Athens is the most important for its influence upon the progress of civilization. Here the kingly power terminated with Codrus, and was succeeded by the office of archon, at first limited to the royal family and held for life, then held for 10 years, and finally thrown open to the whole body of the nobles, the number of archons increased to 9, and the period of office reduced to one year; and with this last change, the authentic history of Athens commences, about 688 B. C. The legislation of Draco dates about 600 B. C., and the archonship and legislation of Solon 594 B. C. The adoption of his constitution, and the subsequent modification of it by Olisthenes, reacting upon the original tendencies of the Ionian race to a free intellectual and political development, produced the results in letters, art, philosophy, political science, and popular eloquence, which so brilliantly distinguish the history of the Athenian commonwealth. But even in Athens a tyranny arose. Pisistratus was twice expelled, but he and his family ruled Athens with moderation, and administered the government through the Solonian institutions, until the assassination of Hipparchus converted his surviving brother Hippias into a despotic and remorseless oppressor. The tyranny of the Pisistratids lasted about 50 years. The expulsion of Hippias was followed immediately by the popular changes in the constitution introduced by Olisthenes. The progress of Athens under the impulse of such wise and equal institutions excited the jealousy of Sparta, who made several unsuccessful attempts to overthrow the democracy. Beside the colonies in Asia Minor already mentioned, the Greeks extended their colonial system to Italy, Sicily, Gaul, Spain, Africa, and, in the north, to Epirus, Macedonia, Thrace, and the coasts of the Euxine. The Asiatic colonies were the oldest, and among

them literature and the arts first developed themselves. The settlements in Italy and Sicily began about 785 B. C. The settlements in Egypt and Cyrene were commenced about a century later. About 700 B. C., the island of Corcyra was settled by Corinthian colonists, and other settlements were soon afterward made on the neighboring islands and the opposite coast; so that, at the beginning of the 6th century B. C., the Hellenic race, in extent of territory and resources, was far the most powerful in the European world.—We have now reached the period when the Hellenic and barbaric races were preparing for an organized conflict. The Greeks of Asia Minor had been subjected by Croesus, king of Lydia, and were afterward ruled by Cyrus, the founder of the Persian empire. Darius, son of Hystaspes, ascended the Persian throne 521 B. C. The revolt of the Ionian colonies from the Persian rule commenced effectively about 501, and the mother country was appealed to for aid. The Athenians voted to send a squadron of 20 ships, which Herodotus says "were the beginners of evil both to Greeks and barbarians." In the following year Sardis was captured and burned by the Greeks under Aristagoras, and the revolt extended far and wide. Measures were speedily taken to suppress it. The capture of Miletus and the defeat of the Ionian fleet at Lade completed the subjection of Ionia, 495 B. C. This event put an end to the ancient prosperity of Ionia. Darius made preparations to follow up its reduction by the conquest of Greece itself. Placing a large armament under the command of Mardonius, his son-in-law, he sent him across the Hellespont; but the destruction of the accompanying fleet, while attempting to double the promontory of Athos, by a hurricane, and the slaughter of a large portion of the land force by the Brygians, a Thracian tribe, forced him to return to Persia. This was the first Persian expedition to Greece, 493 B. C. The Persian monarch, stimulated by Hippias the exiled despot of Athens, made preparations on a large scale, and in 490 assembled a mighty army in Cilicia, and a fleet of 600 galleys, with horse transports. The command was given to Datis and Artaphernes. Embarking with their forces, they sailed directly across the Ægean, reduced the Cyclades, took Eretria in Eubœa after a siege of 6 days, razed the city, and put the inhabitants in chains. In a few days they crossed to Attica and landed on the plain of Marathon. The Athenians, warned of their approach, made preparations to receive them. Among the 10 generals who, according to the constitution, were chosen at the beginning of the year, were Miltiades, Themistocles, and Aristides. The army marched to Marathon, and encamped on the slopes of the heights that bound the plain on the W. and S., leaving only a narrow passage on the S. into the Mesogæa or Midland. The generals, who, according to Attic usage, commanded on successive days, surrendered their days to Miltiades, thus investing him with the whole power. While they were

waiting for the battle a body of 1,000 heavy-armed Plataeans arrived on the field to share in the perils of the war. The Athenian force amounted to 10,000 heavy-armed soldiers, with no cavalry, and only a few light-armed slaves as attendants. The Persian host, at the lowest estimate, amounted to 110,000 men. The position of the armies is not exactly described by the ancient writers; but, as the object of the Athenians must necessarily have been to protect the city, and as the Persians undoubtedly intended to march upon it through the Mesogæa, which they would enter at the south of the plain, it seems probable that the Greek army was posted in that neighborhood, and not on the declivity near the modern hamlet of Vrana, as is generally supposed. The Persians could not have intended to take the rugged and precipitous paths over the mountains at Vrana and Marathon (the name of another modern hamlet), and there was little need for the Athenians to defend them when they were so well defended by nature. The battle was begun by the Athenians; raising the war cry, they rushed upon the Persians, who, confident in the superiority of their numbers, thought them mad. The wings of the Athenian army were victorious, but the Persians broke the centre, and pursued them into the Midland. Miltiades, recalling the wings from pursuit, charged and routed the Persians and Saccians of the centre. The defeat became general, and the army fled to their ships, which were stationed in lines near the shore. The Persians lost 6,400 men, the Athenians 192. It is impossible to over-estimate the importance of this victory, not only to Greece, but to the course of European civilization. The resentment of Darius, when he received the news of the defeat at Marathon, knew no bounds. He resolved to collect the forces of his empire, and to lead them himself against Athens. Three years were occupied in making preparations on a gigantic scale; but his death in 485 B. C. postponed the threatened invasion. Xerxes, his son and successor, influenced by Mardonius, who was eager to retrieve his reputation, resolved to prosecute the plan of conquest, and to collect forces on a still more magnificent scale. Four years more were occupied with preparations. Troops from 46 different nations were assembled; a large fleet furnished by the subject maritime nations was collected; immense stores of provisions were deposited at stations along the intended line of march; a bridge was constructed across the Hellespont, and a canal cut through the narrow neck that joins the peninsula of Athos to the mainland. The bridge having been swept away by a storm, Xerxes caused two to be built in its place, one for the army and one for the baggage and beasts of burden. The preparations were completed in 481, and in the spring of the following year the pompous march began, from Sardis to the Hellespont, where the army crossed the bridge. The march was continued along the coast of Thrace. In the plain of Doriscus,

through which the Hebrus runs, the forces were numbered, and the land army was found to be 1,700,000 foot, 80,000 horse, and 20,000 men in charge of the war chariots and camels. The fleets consisted of 1,207 galleys and 3,000 smaller vessels; and the naval force amounted to 517,610 men. According to this statement, the military and naval forces amounted to 2,317,610, beside the accessories from the native tribes; so that when Xerxes reached Thermopyla, his army consisted of more than 2½ millions of fighting men, or including attendants, if Herodotus is to be believed, of more than 5 millions. But these statements are incredible, though the extensive preparations made for years give us reason to believe that the army of Xerxes was one of the largest ever assembled. To make arrangements to resist this mighty invasion, a congress of deputies from the Greek states was summoned to meet at the isthmus of Corinth. The Athenians and Spartans attempted to unite them for the common defence; but the terror inspired by the Persian hosts was so great that many submitted at once, and others refused to take part in the congress. The only people N. and E. of the isthmus who dared to defend the country were the Athenians, Phocians, Platæans, and Thespians. The Athenians gave the command of the forces by sea and land to the Spartans, although they furnished ¼ of the fleet. It was at first decided to make stand against the invaders at Tempe, the celebrated and beautiful defile of Mt. Olympus, through which the Peneus flows; but this was found impracticable. The pass of Thermopyla, a narrow defile between the mountains of Cithæra and the Malian gulf, was finally occupied by Leonidas, the Spartan king, with a detachment of 300 Spartans, and 1,000 heavy-armed from the other Peloponnesian states. These, with the troops of the Thespians, Thebans, and Phocians, in all about 7,000 men, prepared to hold the pass against the innumerable host of the Persians. Xerxes was astonished at the audacity of this handful of men, and, sending them a message to deliver up their arms, received from Leonidas the well-known answer: "Come and take them." The attack was commenced by a body of Medes, who were repulsed with heavy loss. Xerxes then ordered his body guard, the 10,000 "immortals," to advance, and, watching the battle from a lofty throne, was seen to leap thrice from his seat as he witnessed their defeat. The battle was renewed on the following day, still without success; but a Malian traitor made known to the Persians a path across the mountains, which enabled them to descend in the rear of Leonidas. To guard against this surprise, a body of Phocians had been posted on one of the summits; but instead of resisting, they retired from the path, and took refuge on a higher part of the mountain, leaving the Persians to descend without interruption on the other side. Leonidas, learning from his scouts what had happened, called a council of war. There was still time to retreat,

and opinions were divided; but Leonidas and his 300, with the 700 Thespians, resolved to sacrifice their lives. The final battle was fought on the following day, the Greeks advancing into the open space in front of the pass and commencing the attack; large numbers of the Persians fell; many were pushed into the sea, and many were trampled to death by the pressure of those in the rear, who were driven to the attack by the lash. Leonidas fell early in the battle. At length, their numbers thinned, their spears broken, and the enemy pressing overwhelmingly upon them, the survivors retreated to a hillock within the pass, where they were surrounded on every side, and every man of them slain. A marble lion was afterward erected on the spot, in honor of Leonidas, and two monuments near by; the first with an inscription that "Here 4,000 Peloponnesians fought with 3 millions of foes;" and the second bearing the immortal couplet of Simonides:

Stranger, the tidings to the Spartans tell,  
That here, obeying their commands, we fell.

The naval battle of Artemisium, at the N. extremity of Eubœa, took place about the same time. The Greek fleet on the following day received a reinforcement of 58 Athenian ships. Another battle was fought, in which the Persians lost the greater number of ships and men; but the Greeks, unable to renew the combat, and learning that Xerxes was in possession of Thermopylae, sailed down the Eubœan strait, rounded the headland of Sunium, and anchored in the strait of Salamis. The Athenians, dismayed at the prospect of the march of Xerxes upon the city, decided to remove with the help of the fleet to the neighboring island of Salamis. A few only remained in possession of the Acropolis, awaiting the Persians. On their arrival, the Persians took post on the hill of Mars, and with some difficulty succeeded in taking the Acropolis and dislodging its defenders. The fleet at the same time made its appearance in the bay of Phalerum. The dissensions among the Athenian commanders came near producing fatal results, but Themistocles, partly by his personal influence, and partly by stratagem, prevented the separation of the fleet. The banished Aristides, generously forgetting his wrongs in the common danger, joined the fleet, and communicated the information that the Persians were in possession of the N. W. entrance into the bay of Eleusis, thus completely surrounding the fleet of the Greeks, still lying in the bay of Salamis. Nothing was left but to fight. Early in the morning the Greeks advanced from the shore of Salamis, shouting a loud pœan, to attack the Persian line, stretching along the opposite coast of Attica as far as the eye could reach. A brilliant description of the battle is given in the "Persians" of the poet Æschylus, who shared in its dangers and glories; the result was a great victory:

All the shores were strewn,  
And the rough rocks, with dead; till, in the end,  
Each ship in the barbaric host, that yet  
Had oars, in most disordered flight rowed off.

The Greeks lost 40 ships, and the Persians 200, beside those which were taken with their crews. Xerxes, who surveyed the battle from a throne erected on the W. slope of Mt. Ægaleos, immediately consulted his personal safety by flight, through Bœotia and Thessaly, to the Hellespont, and crossing over to Asia by the aid of his fleet (his bridge of boats had been washed away), he returned to his capital. Mardonius was left in command of the army, but thought it prudent to postpone further operations until spring. On the same day with the battle of Salamis, the Sicilian Greeks, commanded by Gelon, gained a great victory over the Carthaginians, under the command of Hamilcar, at Himera. Before opening a fresh campaign in the spring, Mardonius made an attempt to detach the Athenians from the cause of Greece. Failing in this, he marched upon Athens, and occupied it a second time, 479 B. C., compelling the citizens to move again to Salamis. Ambassadors were sent to Sparta, and after some delay a considerable force was sent into the field, by the Lacedæmonians and the Peloponnesian states. Upon learning these measures, Mardonius withdrew into Bœotia, and took up a position on the left bank of the Asopus near the town of Platæa. The Greek army, now amounting to 110,000 men, moved from Eleusis, and after several days of manœuvring, with skirmishes of cavalry between the outposts, fought the battle of Platæa, defeated the Persians, stormed their camp, and took an immense amount of booty. Mardonius was slain. At the same time, the Persian fleet was utterly defeated at Mycale, a promontory near Miletus, by the Spartan admiral Leotychides, who had crossed the Ægean sea in pursuit. These decisive events put an end to the Persian invasions of Greece. In the following year, a fleet was sent, under the command of the Spartan regent Pausanias, to expel the Persians from Cyprus, Byzantium, and the ports in Thrace which they still held. The expedition was successful; but Pausanias had not the virtue to resist the temptations of his position. He opened a treasonable correspondence with the Persian court, assumed the style and manners of an oriental despot, and mortally offended his countrymen by the haughtiness of his bearing. The Spartans recalled him, and appointed Dorcis in his place. He returned to Byzantium in a private capacity, and renewed his negotiation with the Persian, but was ordered home a second time, under pain of being denounced as a public enemy. Not daring to disobey, he was at first imprisoned by the ephors, but as no overt act was proved against him, he was soon set at liberty. But continuing his intrigues, he was finally detected, and taking asylum in the temple of Minerva, whence he could not lawfully be dragged, he perished by starvation. At Athens, the conduct of Themistocles laid him open to the attacks of his political opponents, and in 471 B. C. he was ostracized. The Lacedæmonians demanded that he should be tried

before the synod of the allies; but he fled from Argos, where he was living in exile, first to Corcyra, then to the court of Admetus, king of the Molossians, and finally to the court of Artaxerxes, the son and successor of Xerxes, where he was honorably received, and passed the remainder of his days. It was said that his remains were secretly brought to Athens, and to this day there exist, on the right of the entrance into the harbor of Piræus, overlooking the scene of the battle of Salamis, the massive foundations of a structure popularly known as the tomb of Themistocles.—At the close of the Persian wars the noble conduct of Athens gave her a commanding position in the affairs of Greece. A league was formed, entitled the confederacy of Delos, because the deputies were to meet in synod there, at the temple of Apollo and Artemis, the general object being to secure the common defence against Persian aggression by the maritime power of Athens. The members of the league were to pay an annual amount, the assessment of which was intrusted to Aristides, whose integrity of character had given him the surname of the Just. The officers charged with the administration of the common fund were appointed by the Athenians, and bore the name of Hellenotamæ. In 470 B. C. an expedition was sent to Scyros to bring back the bones of the national hero Theseus; they were deposited in a temple called the Theseum, which is the best preserved of all the ancient buildings in Athens at the present day. The city was rebuilt on a larger scale than before, and rapidly became the leading maritime and commercial power of Greece. It was strongly fortified, and the harbors of Piræus and Munychia were protected by a wall along their shores, and chains, supported by towers, at their entrance, and the fleet was annually increased by the addition of 20 triremes, under the advice of Themistocles; the constitution was also made still more popular. The rising prosperity of the state, even at this early period, began to excite the jealousy of Sparta, which attempted to interfere, but was checked by the superior craft of Themistocles. The death of Aristides, about 4 years after the exile of Themistocles, left Cimon the leader of the conservative party at Athens. A double victory by sea and land over the Persians at the mouth of the Eurymedon, greatly increased his reputation and influence. In 465 B. C. an expedition against Thasos presented the opportunity for a hostile manifestation on the part of the Spartans, which foreshadowed the Peloponnesian war. The Thasians applied to the Lacedæmonians, who agreed to make a diversion in their favor by invading Attica; a promise they were only prevented from keeping by an earthquake in 464 B. C., which laid their capital in ruins, destroyed more than 20,000 citizens, and encouraged the helots to revolt. The Messenians, taking advantage of these calamities which had befallen their ancient oppressors, fortified themselves on Mt. Ithome, and held out more than 2 years, when

the Lacedæmonians finally dislodged them with the assistance of their allies. Athens then increased in power, while Sparta was declining. Pericles, the son of Xanthippus, now came forward as the leader of the popular or democratic party, and the opponent of Cimon. He was the author of further changes in the constitution. He limited the power of the areopagus and of the senate of the 500, enlarged the jurisdiction of the popular courts or dicasteries, and established the payment of judicial fees, thereby giving the great body of jurymen a pecuniary interest in the increase of litigation. The foreign policy of Pericles carried out the political principles of Themistocles, and aimed to render Athens the leading power of Greece. In 458-457 B. C. he began the long walls, which connected Piræus and Phalerum with Athens, thus enclosing the city and the ports in one uninterrupted series of fortifications. The Spartans, whose jealousy of Athens was still further increased, endeavored to check her power by marching into Bœotia and increasing the power of Thebes; and in consequence of intrigues of the oligarchical party in Athens, they sent an army to Tanagra, on the borders of Attica. A battle followed, in which the Lacedæmonians had the advantage, but were not decisively victorious. The generous conduct of the ostracized Cimon on this occasion led to his recall from banishment, the decree for this purpose being proposed by Pericles himself. In the following year, 456, the battle of Cnophytia was fought, and Thebes and other Bœotian towns fell under the dominion of Athens. Phocis and Locris came next. In the next year the long walls were completed, and Ægina reduced to the condition of a tributary ally. In 452 the Lacedæmonians concluded a 5 years' truce with Athens, through the mediation of Cimon, who was anxious to resume operations against the Persians; but his death occurred during the siege of Citium in Cyprus, and the Phœnician and Cilician fleet was defeated at Salamis, a town on that island, by his successor Anaxicrates. The pacification known as the "peace of Cimon" followed these events. The custody of the common fund at Delos was now transferred to Athens, which had rapidly become the imperial head instead of an equal member of the league. The height of her power may be dated about 448 B. C. In the following year she lost her ascendancy in Bœotia, Phocis, and Locris, and a revolt broke out in Eubœa and Megara. Eubœa, however, was soon reduced by Pericles; but Athens never recovered her other possessions, while a formidable confederacy was organizing against her in the Peloponnesus. In 445 the Athenians concluded a truce with Sparta and her allies for 30 years. Pericles still pursued his policy of aggrandizing and embellishing Athens; but for a time he had a powerful opponent in Thucydides, the leader of the conservative party, whose banishment two years after left Pericles almost the undisputed master of Athens. It was at this period that

the city was adorned with the grand works of statuary, architecture, and painting, which made her not only the glory of Greece but the school of the world. Pericles enlarged the empire of Athens by colonization, from the shores of the Euxine to Italy. He increased the sum of the contributions to more than double the original amount. The Athenians now considered themselves the sovereign head of the league. All the important questions, all public suits, and all private suits in which an Athenian was one of the parties, were decided at Athens; and the city began to be called "the despot." The Peloponnesian war had its remote origin in the jealousies that had long been growing between Sparta and Athens, which were strengthened by the antagonism between the Ionian and Dorian institutions, the former represented by Athens and the latter by Sparta; but the immediate occasion of the commencement of this ruinous conflict was a quarrel between Corinth and Corcyra, in relation to Epidamnus, a colony established by the latter on the coast of Illyria. The Corcyrean fleet defeated the Corinthians in a battle near Aotium, 485 B. C. The Corinthians spent 2 years in preparing to avenge this disgrace; and the Corcyreans applied to Athens for aid. Under the counsels of Pericles, who foresaw that war was inevitable in the end, a defensive alliance was concluded with Corcyra, and a fleet of 10 triremes was despatched for their support in case of their territory being invaded. A naval battle took place off the coast of Epirus, 482 B. C., in which the Corinthians were victorious. At first the victors resolved to renew the attack and effect a landing at Corcyra; but the appearance of 20 Athenian sail in the distance caused them to change their purpose, and they returned to Corinth with about 1,050 prisoners, 800 of whom were sold as slaves, and the remainder, who belonged to the first families of Corcyra, were kept as hostages. The Corinthians, offended with the part taken by the Athenians in these affairs, assisted the Potidæans, their colonists, now tributary to Athens, who had been stirred up by Perdiccas, king of Macedon, to revolt against the imperial city. A general meeting of the Peloponnesian confederacy was called at Sparta, and deputies from the several states appeared, 482 B. C. Their charges against Athens were answered by an ambassador, who happened to be resident there at the time, on other business; but a large majority of the assembly voted for war. Before carrying the vote into execution, the Spartans made several demands upon the Athenians: 1, the banishment of the Alcæonides, among whom Pericles himself was included; 2, the withdrawal of the Athenian troops from Potidæa, the restoration of independence to Ægina, and the repeal of a decree against Megara; 3, a recognition of the independence of the other Grecian states. Pericles in a powerful speech argued that no concessions could avert the war, and an answer in accordance with his views was returned. Hostilities were commenced the

next year by an attack of the Thebans upon Plataea. The war, being thus openly begun, soon drew into its vortex nearly all the states of Greece. On the side of Sparta were ranged all Peloponnesus except Argos and Achaia, the Megarians, Bœotians, Phocians, Opuntian Locrians, Ambraciots, Leucadians, and Anactorians. The Dorian cities of Italy and Sicily were expected to furnish a fleet, and it was even contemplated to invite the Persian king to send a Phœnician squadron against Athens. The allies of the Athenians were the Chians, Lesbians, Corcyreans, Zacynthians, and afterward the Cephallenians; the tributary cities on the coasts of Thrace and Asia Minor, and the islands N. of Crete, except Melos and Thera. Archidamus, the Spartan king, leading a force of from 60,000 to 100,000 men, marched from the isthmus, where they had assembled immediately after the attack upon Plataea, crossed the Attic border, and entered the Thracian plains in June, 481 B. C. Pericles collected the inhabitants of Attica within the walls of the city, and abandoned the country to the ravages of the invaders, while he sent a fleet to lay waste the coasts of Peloponnesus. About the end of the summer Archidamus retired from Attica and disbanded his army, and some time afterward Pericles delivered in the Ceramicus the funeral oration over those who had fallen in the campaign, the substance of which is preserved by Thucydides. In this discourse, the great statesman exhibited the merits of the Athenian constitution, and the social life and genius of the people for art and letters, as silently contrasted with the repressive system of the Spartans, and in a very eloquent and skillful manner appealed to the patriotic pride of his hearers in the great achievements of their ancestors. The second invasion of Attica by the Lacedæmonians took place the next year. The sufferings of the people were terribly increased by the plague of Athens, of which Thucydides, one of the few of those attacked who survived, gives an accurate and powerful description. The demoralizing effects of the despair produced by this mysterious disease were worse than the physical sufferings. It was estimated that not less than a fourth of the population was carried off. In this extraordinary and calamitous state of affairs an outcry was raised against Pericles, as the author of the public misfortunes. On his return from a naval expedition against Peloponnesus, he was accused by Cleon, a rising demagogue, of peculation, brought to trial, and condemned to pay a fine. But the popular feeling veering about, he regained his influence, and was reelected general. Soon after, however, he was attacked by the disease, which had already carried off his sister and his two sons Xanthus and Paralus, and died of a lingering fever, which supervened upon the plague, and, in the weakened state of his constitution, proved fatal. The death of Pericles, whose character is admirably drawn in a few vigorous lines by Thucydides, struck a deadly blow to the Athenian cause. The men who

seized the control of the state were greatly his inferiors in moral character and all statesman-like qualities. In the second year of the war, the Lacedæmonians made some attempts and did some harm to the Athenian possessions by sea. In the following winter Potidæa capitulated, having been instigated to revolt by the Lacedæmonians, and the territory was occupied by colonists from Athens. Two invasions were made in 429 B. C.; and the memorable siege of Plataea, which ended two years later, commenced. After the surrender the Lacedæmonians cruelly put to death, by a summary process, every man who fell into their hands, and utterly destroyed the city. In the same year Phormio gained several naval victories for Athens in the Corinthian gulf. In 428 Attica was again invaded. Mitylene, the capital of Lesbos, revolted, and a fleet was despatched against it. The aid of the Lacedæmonians was invoked, and succors promised; but delays occurring in sending them, the party of the Mityleneans favorable to Athenian supremacy opened negotiations with Paches, the Athenian commander, and a capitulation was agreed upon. The leaders of the revolt were sent to Athens, where a remarkable debate was held on the question of putting the whole body of the Mityleneans to death. On this occasion Cleon exhibited the coarse and violent character which made him an object of detestation to the humaner spirits among his countrymen. His savage proposal of a general massacre was at first carried by a small majority, and a trireme was despatched with orders to Paches to put it immediately into execution. But the cooler second thoughts of the people in the assembly of the following day led to a reversal of the decree, and a second trireme, rowed by oarsmen stimulated by the promise of large rewards, being sent with counter orders, happily arrived in season to arrest the execution of the decree; and the Athenian people were saved from the infamy of an act which would have been a dark blot on their history. To this period belong the bloody feuds at Corcyra, of which Thucydides has drawn a masterly picture. The year 426 B. C. was marked by calamities of another kind—by floods, earthquakes, and the reappearance of the plague at Athens. In 425 the Athenians established a garrison at Pylos, the modern Navarino, which recalled the Peloponnesian fleet from Corcyra, and the army from Attica, where they had been only 15 days. An assault was made, led by Brasidas, one of the bravest and most skilful commanders Sparta ever sent to the field. The assault was not successful, and while the Lacedæmonians were preparing to renew it, the Athenian fleet entered the port, and in the battle that ensued gained a decisive victory. The Athenians now blockaded the Lacedæmonians, shut up on the little island of Sphacteria. The besieged, who were the flower of the Spartan citizens, were reduced to such straits that an armistice was solicited to enable the Lacedæmonians to send to Athens and sue for peace. The Athenian assembly, un-

der the influence of Cleon, insisting on extravagant terms, the war was resumed. Demosthenes, the Athenian general, not succeeding as quickly as was hoped in reducing the garrison, sent to Athens for further assistance, communicating at the same time intelligence of the actual state of the siege. Cleon vehemently attacked the conductors of the war, and boastfully declared that if he were general the island would be captured without delay. Unexpectedly to him, the people whimsically took him at his word. Unable to decline the honor thrust upon him, Cleon departed to the scene of his command; and, by availing himself of the preparations Demosthenes had already made, he was able to keep his promise, and arrived at Athens with the Spartan prisoners in 20 days after his departure. The Athenian fleet, after the victory, proceeded to Corcyra, and witnessed another series of political massacres, without attempting to prevent them. In 424 the Athenians were defeated at Delium, and met with severe losses in Thrace, while Nicias was reducing Cythera, and garrisoning its principal towns. The Lacedæmonians added to the customary atrocities of war the murder of 2,000 helots whom they pretended to emancipate. The Athenians sent expeditions against Megara and Boeotia, the former of which was only partially successful, and the latter a disastrous failure—the defeat of Delium, already mentioned. This battle was rendered famous by the presence of Socrates, and of the gifted but profligate Alcibiades. These disastrous events, especially the defeats in Thrace, disheartened the Athenians. In 423 a truce was concluded for a year, with a view to a permanent peace. But the negotiations were interrupted by the revolt of Scione to Brasidas, and hostilities in that quarter were renewed. In 422 Cleon was despatched to the north, with a fleet and army; but he showed his incompetency to encounter Brasidas, and fell in a disgraceful retreat before that general from Amphipolis. Brasidas himself received a mortal wound, and expired at Amphipolis, leaving behind him a reputation for brilliant talents and noble qualities of character, which were by no means common among his military countrymen. In 421 the peace of Nicias was concluded, followed by an alliance offensive and defensive between Athens and Sparta. An attempt was soon made to form a new confederacy under the leadership of Argos, excluding Athens and Sparta. Difficulties sprang up between these two states, which were fomented by Alcibiades, who had now risen to influence in the state, and bore a private grudge against Sparta; he advocated a league with Argos, and resorted to tricks and intrigues to carry his point. Accordingly in 420 a treaty for 100 years was made with Argos, Elis, and Mantinea. In the summer of this year Alcibiades appeared with extraordinary magnificence at the Olympic games, and being twice proclaimed victor in the 4 horse chariot race, celebrated the event by a grand banquet in his tent. In 418, in consequence of

these events, and the insolence of Alcibiades, the Lacedæmonians sent an army into the territory of Argos, and the battle of Mantinea crowned the Spartan arms with victory over the Athenian and Argive forces. Civil disorders and revolutions and counter revolutions followed at Argos. In this same year the Athenians conquered the island of Melos, and, on the atrocious proposal of Alcibiades, put the men to death, sold the women and children into slavery, and established an Athenian colony on the island.—The feuds that distracted Greece broke out with baneful effect in the Sicilian and Italian colonies. This led to the intervention of Athens and the fatal Sicilian expedition. In 427 B. C. Gorgias of Leontini was sent to Athens to ask succor for his countrymen. A squadron of 20 ships was immediately sent, and in 425 another of 40; but the Sicilians were alarmed, and the expeditions were without effect. Another application was made in 422, but unsuccessfully. In 416 Segesta, having a quarrel with Selinus, sent an embassy for aid, the Syracusans having taken sides with the Selinuntines. Alcibiades supported the demands of the Segesteans, in opposition to the policy of Nicias and his party. It was decided to send a fleet of 60 triremes, under the command of Nicias, Alcibiades, and Lamachus, in the expectation, not only of assisting Segesta and Leontini, but of extending the power of Athens over all Sicily. Three months were spent in making preparations on a grand scale, and the greatest enthusiasm prevailed. Just as the armament was on the point of sailing, the superstitious terrors of the Athenians were roused by the mutilation of the Herma, or square pillars surmounted with the head of Hermes, standing in the streets and public squares, and the public suspicion fell upon Alcibiades as the author of the sacrilege. This crime, together with the profanation of the Eleusinian mysteries by a private representation, was charged upon him by Pythonicus, in the public assembly. But instead of an immediate investigation, his political enemies caused it to be postponed till his return; and the fleet departed from the Piræus on the voyage, in the presence of a vast concourse of people, who watched the vessels until they were out of sight. The rendezvous was appointed to be held at Corcyra, whence the combined fleet of the Athenians and their allies sailed for the Iapygian promontory, and thence to Rhegium, where they awaited the return of the fast sailing triremes which had preceded the main body to Segesta. The reports brought back were not very encouraging, and there was a difference of opinion among the generals. Alcibiades was met at Catana by a summons to return to Athens, and take his trial on the charge of profaning the Eleusinian mysteries. The state ship *Salaminia* brought the order; but on the way home Alcibiades escaped. The trial went on according to Athenian usage, and though absent, he was condemned to death. After some months' delay Nicias commenced operations against Syracuse,

and having gained a victory, retired to Catana, and afterward to Naxos, into winter quarters. The Syracusans occupied the winter in preparations for defence. In the following spring the siege of Syracuse was commenced, the details of which fill some of the most important and interesting chapters in Thucydides. Just as the Syracusans were on the point of surrendering, Gylippus the Spartan arrived in Sicily, with a small force, and landing at Himera, on the N. coast, levied an army, and marched upon Syracuse. This changed the face of affairs, and put to flight all thoughts of surrender. Two naval battles were fought in the great harbor. In the first the Athenians gained the advantage, but they were defeated in the second. Meantime, the Lacedæmonians at home had ravaged the Argive territory, and the Athenians had sent a fleet against Epidaurus, 414 B. C. The next year the Lacedæmonians invaded Attica and established themselves in Decelea, acting under the advice of Alcibiades, who had passed over from Italy to Peloponnesus. Yet the Athenians resolved not only to ravage the coast of Laconia, but to send reinforcements to Sicily. They accordingly despatched 75 triremes, under the command of Demosthenes, with 5,000 heavy-armed and a large body of light-armed troops. After several unsuccessful attempts upon the outer positions, and when sickness broke out among the troops, it was found necessary to withdraw from the great harbor; but an eclipse of the moon, occurring on the appointed night, prevented their departure. This fatal delay gave the Syracusans an opportunity of attacking them by land and sea. Gylippus suffered a repulse by land; but the Athenian fleet was defeated, and Eurymedon the commander slain. The entrance to the harbor was blocked up. A terrible battle was immediately fought, the Athenian fleet driven ashore, their crews leaping out, and flying to the camp for refuge. Escape by sea was now out off. The ships were all abandoned to the enemy; and in attempting to retreat by land, the divisions of the army, greatly reduced by their sufferings, were successively surrounded and made prisoners. The captives were set to work in the stone quarries of Achradina and Epipolæ. Nicias and Demosthenes were doomed to death. The calamitous close of this expedition, commenced with exaggerated hopes of wealth and glory, overwhelmed the Athenians with sorrow and despair. As is usual in such cases, the popular fury vented itself on those who had proposed or encouraged the enterprise. The occupation of Decelea by the Lacedæmonians still harassed the city, keeping it almost in a state of siege. The consequences soon began to be felt in the defection of the allies and subjects, who were encouraged and aided by Sparta in throwing off the yoke. Alcibiades was actively engaged in stirring up the spirit of revolt. But the Athenians were not long in taking measures to remedy as well as they could these terrible disasters. They appointed a committee of public safety, under the name of *pro-*



*buli* (προβουλοι), commenced a new fleet, and fortified Sunium. Acting under the advice of Alcibiades, the Lacedæmonians sent a fleet in aid of the Chians. The movement was successful, and other cities and islands on the Asiatic coast followed the example of revolt. The Athenians now appropriated the fund of 1,000 talents reserved by Pericles to fitting out a fleet against the Chians; but the revolt continued to extend, embracing Teos, Lesbos, and Miletus. The Samians remained faithful, and Samos became the head-quarters of the Athenian fleet. Several victories soon crowned the changing fortunes of Athens. By this time Alcibiades, whose manners also were offensive to the Spartans, excited their distrust by his intrigues with the Persians. At length he brought matters to such a pass that the Athenians, pressed by the necessities of their condition, agreed to restore him, and to change the constitution to an oligarchy, on condition of aid from Persia. A revolution was effected, and the government of the 400 established, with the power of convening a select body of 5,000 citizens whenever they saw fit; but the expected aid from Persia was not received. The 400 opened negotiations with Agis, the Spartan king. But dissensions broke out, a counter revolution was partially successful, and the democratic constitution was maintained in Samos. The Lacedæmonians failed to seize the opportunity of striking a blow by taking the Piræus, but the Athenian fleet was defeated at Eretria in Eubœa. The old constitution was finally restored, and several leaders of the oligarchical party, among whom was Antiphon the orator, were put to death. From this period, although the Lacedæmonians still held possession of Decelea, the war was mainly carried on by sea. An attempt was made by Mindarus, the Lacedæmonian commander, to effect a revolt of the Athenian dependencies in the neighborhood of the Hellespont. Thrasyllus the Athenian followed him, and the battle of Cynossema, in which the Athenians were victorious, was fought, 411 B. C.; the shattered remains of the Lacedæmonian fleet were wrecked off Mt. Athos. Another battle was soon after fought near Abydos, which was decided in favor of the Athenians by the arrival of Alcibiades from Samos. A third battle was fought near Cyzicus the next year, and, the Spartan running his ships ashore, Mindarus was slain, the fleet taken, and the Athenians became again masters of the Propontia. The Lacedæmonians now offered peace; but the Athenians, elated by their recent victories, and influenced by the harangues of Cleophon the lamp maker, rejected the terms. In the two following years the Athenians recovered Selymbria and Byzantium, chiefly through the active services of Alcibiades; and in 407 B. C., after an exile of 8 years, he was fully restored, the sentence against him annulled, and he was placed with unlimited powers at the head of all the forces of the republic, by land and sea. In the mean time, Cyrus, the younger son of Darius, was

sent down as satrap to the provinces of Lydia, Phrygia, and Cappadocia, and the able Lysander was sent from Sparta to take command of the Lacedæmonian fleet. They resolved to act in concert. Alcibiades sailed from Athens to Andros, where he left a part of the fleet under Conon to prosecute the siege, and proceeded to Samos. He attempted to raise money by force; and while absent from Samos on this business, his pilot Antiochus, contrary to his orders, hazarded a battle, and sustained a defeat. These events, and the profligate conduct of Alcibiades, lost him the confidence of the Athenians, and he was deprived of his command. Ten new generals, the chief of whom was Conon, were appointed to supersede him. A battle was fought between Conon and Callicratidas, the successor of Lysander, in the harbor of Mytilene, in which Conon lost 80 ships; but the Athenians, learning this disaster, despatched with incredible speed 110 triremes, and a great battle followed near the little islands called Arginusæ, in which the Lacedæmonians lost 77 vessels, 406 B. C. The generals were brought to trial at Athens, on a charge of not collecting the bodies of the dead for burial, and 6 of them were executed in a moment of popular frenzy. Socrates, who happened to be one of the presiding officers at the public assembly, protested against the proceeding and refused to put the vote; but the next day a more pliant officer went through the form, and the great crime was consummated. Callicratidas having perished in the battle, Lysander was reinstated in the command in 405; and proceeding to the Hellespont, he took up his station at Abydos. The Athenians, hearing of this movement, also sailed to Ægospotami near Lampæacus, which Lysander was besieging. After 5 days of manœuvring, the momentous battle was fought which put an end to the war by the ruin of Athens. Conon escaped with only 8 or 10 ships, out of 180; 8,000 or 4,000 Athenian prisoners were put to death, with the generals. The night when the news of this disaster reached Athens, "no man slept." It was in Sept. 405 B. C. that Lysander received the submission of the Athenian cities, and established in them oligarchies of ten (decarchies). He reached Athens in November, and the Peloponnesian army marched into Attica, encamping near the city, on the grounds of the academy. After 8 months of dreadful sufferings by famine, the Athenians surrendered; and in March, 404, Lysander took formal possession of the city. The conditions of the surrender were executed; the walls and fortifications were dismantled to the music of the flute; the arsenals were destroyed, the ships on the stocks burned, and all the fleet except 12 triremes carried off by Lysander. The government of the thirty, called the thirty tyrants, was established, and Lysander, sailing to Samos, soon reduced that island, and then returned to Sparta loaded with honors. The government of the thirty soon made themselves feared and hateful, establishing by their tyrannical and bloody acts a

reign of terror. It is said that 1,500 were executed without trial. Alcibiades was included in the list of exiles; but he was put to death by Pharnabazus, the Persian satrap, in compliance with orders transmitted from Sparta to Lysander. The state of feeling in Greece soon began to turn against the Lacedæmonians. They had shown a grasping disposition, and Lysander, puffed up by his military successes, was haughty and tyrannical. Thrasybulus and other Athenian exiles ventured to seize the fortress at the pass of Phyle, on Mt. Parnes, and the thirty were repulsed in an attempt to dislodge them. The thirty, feeling their position insecure, resorted to still more atrocious and bloody means of perpetuating their power; whereupon Thrasybulus marched down to Piræus and occupied the hill of Munychia. The thirty, with the whole force at their command, attacked them; but Thrasybulus fell upon and defeated them, and slew 70, with Critias their leader. A new government of ten was established at Athens, and the aid of the Lacedæmonians was invoked. Pausanias, having superseded Lysander, led an army into Attica, and after several unimportant combats, terms were agreed upon, 403 B. C.; the exiles were restored; the democracy was reestablished, with all the old administrative bodies; the acts of the thirty were annulled, and the old laws revised, and inscribed on the walls of the Pæcile Stoa, in the full Ionic alphabet of 24 letters, then for the first time introduced into the public records. In 401 occurred the episode of the Anabasis, or expedition of Cyrus the Younger, which is connected with the history of Greece by the circumstance that his army consisted in part of Greek mercenaries, and that Xenophon the historian served as volunteer, and conducted the Greek troops back to the sea, after the battle of Cunaxa.—The period following the downfall of Athens is that of the Spartan supremacy, which lasted 84 years, from 405 B. C. till the battle of Leuctra, 371 B. C., although her maritime power was greatly diminished by the battle of Onidus, in 394. The conquest of Elis in 402 extended her power in Peloponnesus; but she soon entered upon a course of degeneracy and decay. The intrigues of Lysander, and the large sums of gold and silver introduced into the country, tended to change and corrupt the ancient character of the Lacedæmonians, and to produce great inequalities in the condition of the citizens. Troubles soon broke out in Asia Minor, and a Lacedæmonian force under Timbron was despatched to protect the Ionian cities against Tissaphernes and the Persians. He was succeeded by Dercyllidas. In 397 B. C., after several encounters, an armistice was agreed upon; but Pharnabazus seized the opportunity to organize a fleet, which was placed under the command of Conon, who, since the defeat at Egospotami, had lived under the protection of Evagoras, prince of Salamis in Cyprus. Agesilaus invaded Asia with a powerful army in 396, and in 395 marched upon Sardis. Tissaphernes

was put to death, through the influence of the queen mother Parysatis, and his successor Tithraustes made an armistice of 6 months with Agesilaus, who in the mean time was appointed to the command of the Lacedæmonian fleet in addition to that of the army. A new fleet of 120 triremes, under the command of Pisander, was sent out by the Lacedæmonians the following year. In Aug. 394, the great battle of Onidus was fought, in which more than half of the Lacedæmonian fleet was destroyed, and Pisander fell fighting bravely to the last. The discontents in Greece itself with the Spartan power were eagerly fomented by Persian agents, and hostilities breaking out between Sparta and Thebes, Athens was called in by the latter. Lysander was slain in an action at Haliartus, and Pausanias was obliged to retreat. An alliance was formed against Sparta between Athens, Corinth, Argos, and Thebes, and many others soon joined. A meeting was held in 394 at Corinth, and, in this alarming state of affairs, Agesilaus was recalled from Asia. The battle of Corinth, in which the Lacedæmonians gained the victory, was fought in July, 394, nearly at the same time with the battle of Onidus. Agesilaus received the news at Amphipolia, on his way from Asia; and on the frontiers of Phocis and Boeotia he heard of the defeat and death of Pisander at Onidus. Pressing forward, he met the confederate army at Coronea, where a terrible conflict took place, ending in a victory, though not a decisive one, on the side of Agesilaus. The defeat of Onidus cost the Spartans the maritime supremacy they had acquired at Egospotami. The Spartan harmosts (governors) were expelled from the islands. In 398 the coast of Laconia was ravaged by Conon and Pharnabazus; the long walls of Athens and the fortifications of Piræus were rebuilt, and Athens had regained something of her former power, by laying again the foundations of maritime supremacy. The war continued during the following year, in the neighborhood of Corinth, the Spartans making their headquarters at Sicyon, and ravaging the Corinthian plain, beside gaining the advantage in several skirmishes. The triumphant career of the Spartans was interrupted by the victories of Iphicrates, an Athenian commander of a body of mercenaries. Agesilaus returned stealthily to Sparta, and many places in the Corinthian territory were retaken by his aid. The Lacedæmonians sent Antalcidas to negotiate with the Persians, in the hope of regaining their good will; and Tiribazus secretly furnished the Spartans with money, and treacherously seized Conon, who now disappears from history. In 389 a fleet of 40 triremes was despatched from Athens to Asia Minor, under Thrasybulus; but after reestablishing the Athenian supremacy in several places on the Hellespont, he was surprised and slain at Aspendus. Anaxibius was sent from Sparta to succeed Dercyllidas as governor of Abydos, and Iphicrates was despatched from Athens. He attacked Anaxibius

among the passes of Ida, defeated his army, and slew him with 12 other harmosts, thus giving the Athenians again the mastery of the Hellespont. But the Æginetans began to infest the trade of Athens, and the Lacedæmonians, under Teleutias, took the Piræus by surprise, and carried off a considerable amount of booty. In 387 the treaty of Antalcidas was concluded, on terms that were denounced by the Athenian writers a few years later as most disgraceful, but the deputies from the states felt obliged to yield their assent. The substance of it provided that the cities of Asia and the islands of Clazomenæ and Cyprus should belong to Persia, and, with the exception of Lemnos, Imbros, and Scyros, which were to remain to Athens, all the cities should be independent. Sparta now commenced a series of aggressions in Bœotia. Plataea was rebuilt for a Spartan outpost. Mantinea also, against which Sparta owed a grudge, was reduced, dismantled, and placed under an oligarchy. In 383 the affairs of Olynthus, the centre of a powerful confederacy at the head of the Toronaic gulf, attracted the attention of Sparta; and Eudamidas was despatched to the defence of Acanthus and Apollonia, but his army was not sufficiently strong to take the field at once against the Olynthians. Another force was collected by Phœbidas, the brother of Eudamidas, and marched to Thebes, where they treacherously got possession of the Cadmea, or citadel. The indignation which this act excited induced the Lacedæmonians to disavow it, and to dismiss Phœbidas; but they continued to occupy the citadel with a garrison, and Thebes was enrolled as a member of the Lacedæmonian confederacy. The war with Olynthus was closed in 379, with the capitulation of the city, and the dissolution of the league of which she was the head; a great misfortune, as the event proved, to Greece. In the following year a revolution was brought about at Thebes, chiefly by the young Pelopidas, who was living in exile at Athens, and who arranged a conspiracy with some of the leaders of the patriotic party at Thebes, which was carried into successful execution. The garrison capitulated, the exiles returned, and the revolution shook the influence of Sparta throughout Greece. Athens set vigorously to work to organize a new confederacy, and Thebes enrolled herself as one of the earliest members. A congress was held in Athens, and a large army and fleet voted. The war with Sparta was zealously prepared for. At Thebes the famous "sacred band" was formed, and Pelopidas and Epaminondas were actively engaged in organizing the war. Agesilaus marched from Sparta into the Bœotian territory, and laid waste the country, to the gates of Thebes; in the following year he conducted a second expedition, in which he received an injury that withdrew him from active service. The expedition in the next year was accordingly conducted by Cleombrotus, who was forced to retreat by the Thebans, who had seized the passes of Cithæron. In 376 a Lacedæmonian fleet under

Pollio was defeated by Chabrias the Athenian, near Naxos; and Timotheus, another Athenian, son of Conon, sailed to the west of Greece, and gained over to Athens Cephallenia, Coreia, and many of the Epirotes and Acarnanians. Dissatisfaction and jealousy sprung up among the confederates of Athens. Thebes was extending her dominion over the neighboring states, and in 375 Pelopidas gained a victory over the Lacedæmonians at Tegyra. In the following year the Thebans had completely expelled the Lacedæmonians from Bœotia, and menaced Phocia. The Athenians made a peace with Sparta, which was immediately broken, and the successes of the Athenian army on the western coast of Greece so alarmed the Spartans that in 372 Antalcidas was again despatched to solicit the aid of Persia. Fresh negotiations were opened, a congress was held in Sparta in 371, and the peace known as the peace of Calias was ratified by all except Epaminondas, the representative of Thebes. Hostilities between the Thebans and Lacedæmonians almost immediately commenced, and the great battle of Leuctra established the ascendancy of Thebes, while striking a terrible blow at the power of Sparta. Jason, the despot of Phœria, joined the Thebans; but, instead of renewing the attack, he used his influence in effecting a truce by which the Lacedæmonians were allowed to withdraw from Bœotia. The Athenians, dreading the power of Thebes, now formed a new coalition, including most of the Peloponnesian states. In 370 Epaminondas entered Peloponnesus, laid waste the valley of the Eurotas, built Megalopolis, which he peopled with Arcadians, and the town of Messene, on Mt. Ithome, recalling the exiled Messenians. Sparta applied to Athens for help, and an alliance was formed to prevent the Thebans from invading the Peloponnesus. But Epaminondas forced his way through the Oean mountains, and joined his allies in Peloponnesus; though nothing of importance was accomplished, when both armies dispersed and returned home. In 368 Pelopidas led an expedition to Thessaly against Alexander, the despot of Phœria; thence he marched into Macedonia, and made an alliance with Ptolemy, the regent, who gave hostages for the observance of the treaty, among whom was Philip, afterward the king of Macedonia and conqueror at Chæronea. Soon after this the Arcadians were defeated by the Lacedæmonians. Epaminondas entered Peloponnesus again, in order to bring the Achæans, hitherto confederates of Sparta, into the Theban alliance. He succeeded; but a counter revolution was soon after effected, and the Achæan cities went back to Sparta. In 367-6, accompanied by deputies from their allies, Pelopidas proceeded to Susa, on an embassy to the Persian court, and Thebes was declared to be the head of Greece, in spite of the opposition of the Athenians and Arcadians; but the Persian rescript was not received with favor in Greece, even by the allies of Thebes. Pelopidas having been seized by

Alexander of Phæræ, in a mission to Thessaly, an army was despatched for his rescue; and the troops, being in danger from the pursuit of the Thessalians and Athenians, called Epaminondas, who was serving in the ranks, to the command, and under him were safely brought back to Thebes. Epaminondas was restored to the command of the army by the people, and immediately undertook another expedition for the release of Pelopidas, which was entirely successful. The Athenians meantime sent a fleet into the *Ægean* sea under the command of Timotheus, and took Samos, Potidea, Pydna, Methone, and perhaps Olynthus. Thebes, jealous of the growing power of Athens, resolved to try her fortunes on the sea. Epaminondas, in a striking figure of speech, told his countrymen that they must not be content until they had transferred the Propylæa of the Acropolis to the Theban Cadmea. He appeared in 368 with a fleet of 100 triremes in the Hellespont; but he accomplished little, and this was the only expedition undertaken by the Thebans on the sea. In the same year Pelopidas, leading an army against Alexander of Phæræ, defeated him at Cynocephale, but was himself slain in the moment of victory. Alexander was compelled to limit himself to Phæræ, and to become a subject of Thebes. A war in the mean time was waged between Elis and Arcadia, and the presidency of the Olympic games was transferred from the Eleans to the Pisatans, 364 B. C.; the Eleans asserting their rights by force, the temple of the Olympian Jupiter was converted into a fortress. The Eleans were repulsed, but they afterward struck the 104th Olympiad out of the catalogue. In 362 Epaminondas undertook his last invasion of Peloponnesus, in consequence of the acts of the Arcadians. He attempted to surprise Sparta; but though he entered the city, finding that his movements were anticipated, he retired. The hostile forces now concentrated in the plain between Tegea and Mantinea. A battle was fought, in which the Theban commander gained a great victory over the Mantinians and Lacedæmonians, but, while fighting in the foremost ranks, lost his own life. Peace was immediately afterward made in accordance with the advice of the dying Epaminondas.—The Greeks of Sicily had passed through many revolutions, after the defeat of the Athenian expedition in 413 B. C. Diocles introduced a democratical constitution, but in a few years was banished. Hermocrates, the leader of the aristocratical party, was slain in attempting to return to Syracuse (407). These events opened the way for the aspiring designs of Dionysius, who seized the supreme power in 405. He was successful in a war against Carthage in 395-'4, and again in 393; and he extended his conquests into the interior of Sicily and Magna Græcia, thus making Syracuse one of the most powerful states in the Hellenic world. He became a patron of letters, philosophy, and art, and surrounded his throne with the most distinguished poets and philosophers whom he

could attract thither. He died in 367, and was succeeded by his son, the younger Dionysius. This prince, under the influence of Dion, at first gave indications of a liberal disposition. He invited Plato to his court, and seemed on the point of adopting his councils; but growing distrustful of Dion, he banished that wise statesman, and confiscated his property. Plato with difficulty returned to Greece (360), utterly disappointed in the hopes with which he visited Sicily of making a liberal and constitutional ruler out of a despotic prince. The tyrannical acts of Dionysius led to a revolution. Dion landed in Sicily in 357, and was received with joy by the inhabitants. Dionysius, returning from an expedition to Italy, found Dion master of Syracuse, except the citadel of Ortygia. Being unsuccessful in an attempt to recover it, he sailed to Locris, in Italy, in 356, leaving Apollocrates, his son, in command of the citadel, who was soon after compelled by famine to surrender. The Syracusans were disappointed in their expectations of political reform; and Callippus the Athenian, having caused the assassination of Dion in 353, seized the supreme power. He was expelled in about a year by Hipparinus, a nephew of Dion, who reigned 2 years. Another nephew of Dion, Nysseus, held the supreme power when Dionysius, arriving with a fleet in 346, recovered Syracuse, but was unable to reestablish his power over the other Sicilian cities. The Syracusan exiles applying for aid to Corinth, the mother city, Timoleon was despatched with a small fleet, and was received with hearty welcome. Marching upon Syracuse, Dionysius surrendered to him on condition of being allowed a safe conduct to Corinth (343), where he passed the remainder of his days in literary pursuits, and in teaching a school of boys. The exiles were invited to return; colonists were invited from Greece and Italy to Syracuse; the laws were revised; the Carthaginians were defeated with great slaughter at the river Crimæus, and concluded a treaty of peace (338); the despots of the other cities were deposed, and some of them executed; and Timoleon, having thus accomplished the liberation of Sicily, resigned his power and became a private citizen of Syracuse, where his great public services, his incorruptible virtues, and his extraordinary abilities, secured to him not only the reverential regard of his fellow citizens, but unlimited personal influence in public affairs. He died, beloved and honored, in 336.—We now come to the Macedonian period, which closes the brilliant independent existence of the Grecian commonwealth. The wars, of which we have given a rapid sketch, exhausted the resources and demoralized the character of the Greeks, and prepared the way for any powerful neighbor to build up an empire on the ruins of Hellenic independence. For many years the princes of Macedon, claiming to be of Hellenic lineage, had been growing in power, though in the midst of barbarism. Perdiccas founded the monarchy. Under Amyntas it became subject to Persia.

Archelaus, in 413 B. C., built fortresses and roads, and introduced a taste for letters and art. Zeuxis adorned his palace with pictures; Agathon and Euripides were invited from Athens to his court. Archelaus was assassinated in 399. He was succeeded by Amyntas II., the father of the celebrated Philip, who, sent in his youth as a hostage to Thebes, there acquired a taste for Greek literature, and learned the art of war as improved by Epaminondas. Thebes was at this time at the height of her power, and furnished an excellent point of observation for so able a prince as Philip, and he made the best use of his opportunities. At the age of 23 (359 B. C.) he assumed the government. Having disposed of the claims of two pretenders to the throne, he turned his arms against the barbarous tribes in his neighborhood, and, having conquered the Pæonians and Illyrians, became king. He now turned his attention to the Grecian settlements on the eastern frontiers of his dominions; laid siege to Amphipolis, which he took in 358, and thus came into collision with Athens, to which Amphipolis formerly belonged. He secured the good will of the Olynthians by taking Potidæa and bestowing it upon them. In the same year (356) Philip gained the prize in the chariot race at Olympia, and a victory over the Illyrians. This year was further signalized by the birth of his son Alexander. Athens was occupied in the mean time with the social war—a war with her former allies, which commenced in 358, and ended in 355. The sacred war broke out near the same time between Phocis and Thebes, in the midst of which Philip began to interfere in the affairs of central Greece, assuming the character of defender of the god at Delphi. The Thessalian army was defeated near the gulf of Pagasæ in 352; but his march against Phocis was arrested at Thermopylæ by an Athenian force posted there. He then turned his arms northward to Thrace and the Chersonesus. It was at this time that Demosthenes, penetrating the ambitious designs of Philip, came forward as his opponent. But little was done to check a danger which seemed so distant and uncertain, notwithstanding the orator's vehement appeals. In 350, Olynthus, alarmed at the encroachments of Philip, sent envoys to Athens to demand assistance; and their demand was supported by Demosthenes, in the 8 admirable Olynthiac orations; but a strong party headed by Phocion opposed him. Philip prosecuted his schemes almost uninterruptedly, until Olynthus fell into his power (347), betrayed by two of the leading citizens, Lasthenes and Euthycrates, and the Chalcidian peninsula, became subject to Macedon. Demosthenes now put forth strenuous efforts to organize a confederacy of the Grecian states, but without success. Overtures were then made for reconciliation with Thebes, to which the sacred war had become burdensome and exhausting; and Philip, observing this tendency of things, and unwilling that such a combination of powerful states should take place, made advances to

Athens. Ambassadors were despatched to Philip, among whom were Philocrates, the author of the measure, Demosthenes and Æschines, the orators, and Aristodemus, the actor. Some of the ambassadors were gained over to Philip's interest by bribery, as was charged by Demosthenes; and Philip immediately sent envoys to Athens, who arranged a treaty. A second embassy was sent from Athens to receive from Philip the oaths of ratification, with instructions to proceed at once to him wherever he might be. Instead of this they went to Pella, and remained there until his return from Thrace, where he was engaged in an expedition against Kersobleptes, an ally of the Athenians. The treaty was finally ratified at Phars, after nearly 8 months' delay; but the Phocians were excluded, and Philip immediately passed the straits of Thermopylæ, and all the towns of Phocis at once surrendered. Philip then proceeded to Delphi, and called an assembly of amphictyonic deputies, who decreed that all the Phocian cities except Abæ should be destroyed, and that they should repay by yearly instalments the treasures they had plundered from the temple, estimated at 10,000 talents, or about \$10,000,000. The two votes formerly held by the Phocians in the amphictyonic council were transferred to the king of Macedon; Sparta was deprived of her rights there; and Philip was to share with the Thebans and Thessalians the right of presiding at the Pythian games. These events occurred in 346 B. C. Macedon was now the leading power in Greece. Philip commenced a series of intrigues in Peloponnesus, which Demosthenes endeavored to counteract by his personal presence, but with no result. Philip now began his preparations for an attack on the Persian empire, which he had probably long meditated, by marching against Thrace (342), and menacing the Athenian possessions in the Chersonesus, which brought his forces into conflict with Diopithes, who, not limiting himself to the defensive, invaded the places in Thrace which had submitted to Philip. The Macedonian king complained of these proceedings, but Diopithes was defended by Demosthenes, and retained in the command. In 341 Philip continued his movements, captured Selymbria, and attacked Perinthus, but not succeeding in taking it immediately, left a part of his army to continue the siege, and marched upon Byzantium. He addressed a letter to the Athenians, charging them with violating the peace. Demosthenes persuaded them to equip a fleet, which was unfortunately placed under the command of Chares, and the expedition was a failure. Phocion was then appointed in his place, and, sailing with 13 triremes, forced Philip to raise the siege of Byzantium and Perinthus, and to withdraw from the Chersonesus. Philip soon after made an expedition against the Scythians on the Danube, in which he was dangerously wounded. In 339 the amphictyonic council declared war against the Amphissian Locrians, for encroachments on the sacred lands of the temple at

Delphi. *Æschines* was one of the Athenian deputies that year, and the course taken by him in stimulating the passions of the meeting exposed him to grave suspicions of purposely playing into the hands of Philip. *Cottyphus* was first appointed to the command of the amphictyonic forces; but failing in the object of the appointment, the amphictyons gave the command to Philip, now returned from the north. Early in 338 Philip commenced his march; but instead of proceeding directly to Amphissa, he seized Elatea, a town in Phocia, which commanded one of the principal approaches to Boeotia and Attica. This movement, when known in Athens, produced the greatest consternation. An assembly was summoned the next morning. Acting under the advice of Demosthenes, an embassy was despatched to Thebes, of which Demosthenes himself was the leading member; they met ambassadors from Philip, who was anxious to prevent a union between the two cities. The earnest and eloquent representations of Demosthenes carried the day, and an alliance was made. The united armies of Thebes and Athens took the field, and, after gaining the advantage in two skirmishes, fought a decisive battle on the plain of Chæronea. The fortunes of the day were decided by a charge made by the young Alexander upon the Theban sacred band, which was cut to pieces. Demosthenes served in the battle as a foot soldier. The allied army was utterly defeated—an event fatal to the independence of Greece. At Athens the greatest consternation prevailed, but vigorous measures were taken to put the city in a state of defence. Demosthenes was appointed superintendent of the fortifications, and, as a remarkable proof of the confidence of the people in him, he was selected to deliver the funeral oration over those who had fallen in the battle. Philip felt no ordinary exultation in this victory; but he showed great moderation toward the Athenians, offering them favorable terms of peace, and dismissing their prisoners without ransom. The Thebans were more severely dealt with; the exiles were restored, and the government transferred to them, and a Macedonian garrison was placed in the Cadmea. Philip called a congress of the states at Corinth, at which war was declared against Persia, and he was made commander-in-chief. In the autumn he returned to Macedonia to make preparations for his eastern campaign. In the following spring, his marriage with Cleopatra—his wife Olympias, the mother of Alexander, being still alive—caused discords in his family, which seem to have retarded his preparations. The next spring, however, he sent several of his generals, with a body of troops. But he was assassinated while celebrating the nuptials of his daughter at *Ægæ*, by Pausanias, a young man of noble birth, in revenge for the king's refusal to grant him revenge upon Attalus, who had committed a personal outrage upon him, 336 B. C. Alexander, then 20 years old, immediately succeeded to the throne, and announced

his intention to follow in his father's footsteps; but the occasion of Philip's death was seized to throw off the Macedonian supremacy. Alexander's vigor and rapidity of action disconcerted the movement. He advanced rapidly toward Thebes, and the Athenians, in alarm, despatched envoys to deprecate his anger. A general congress was assembled at Corinth, and Alexander was appointed to his father's place as commander-in-chief of the expedition against Persia. Returning to Macedonia, with the intention of commencing his march to the East, he was prevented from carrying his plans into immediate execution by the disturbed state of the Thracians and Triballians. He marched into the country, and quickly reduced them to obedience; but his absence in the north tempted the Greeks, especially the Athenians and Thebans, into another insurrection. Alexander suddenly appeared in the neighborhood of Thebes, defeated the insurgents, took the city, sold the inhabitants into slavery, and levelled the houses, except that of Pindar, preserving only the Cadmea for a Macedonian garrison. He demanded that the 10 leading orators of Athens should be surrendered to him, and was only induced to desist from this requirement by the intercession of Phocion. Having settled the affairs of Greece, and leaving Antipater as regent, in the spring of 334 B. C. he set out on his march for the Hellespont. (See *ALEXANDER THE GREAT*.) Alexander dying at Babylon in 323 B. C., the affairs of his immensely extended empire were arranged as follows. His half brother Philip Arrhidæus was declared king, with a reservation in favor of the child of Roxana should it be a son; but Antipater and Craterus were to share the government of Macedonia and Greece; Ptolemy was to have Egypt and the neighboring countries; Antigonus, Phrygia proper, Lycia, and Pamphylia; Leonnatus, Hellespontine Phrygia; Eumenes, Paphlagonia and Cappadocia, when they should be subdued; and Lysimachus, Thrace. Perdicas reserved to himself the command of the horse guards, and the guardianship of Philip Arrhidæus. The child of Roxana, proving to be a son, was called Alexander, and made the partner of Philip Arrhidæus.—In Greece attempts were made, in the absence of Alexander, to throw off the Macedonian yoke. The Spartans took up arms, but were defeated near Megalopolis by Antipater, 331 B. C. In 325 Harpalus arrived in Athens with treasures he had stolen from Alexander; but though he attempted to bribe the leading politicians, he did not secure the protection of the state as he had expected. In 330 the prosecution of Ctesiphon by *Æschines*, on a complaint laid before the magistrates immediately after the battle of Chæronea, had been brought to a conclusion, resulting in the triumph of Demosthenes. But the great orator was unfairly and without evidence condemned on a charge of being bribed by Harpalus, and went into exile. The news of Alexander's death made a great change, and the

party opposed to Macedon in Athens immediately rose to the supremacy. An extensive confederacy was formed, an army was assembled near Thermopylae under the command of Leosthenes, and Antipater, who had thrown himself into Lamia near the Malian gulf, was closely besieged. He was reduced to such straits that he sent an embassy to Athens to sue for peace; but the Athenians refused to listen to any terms short of unconditional surrender. Meantime Demosthenes, though in exile, had joined the ambassadors who were sent from Athens to rally the other states, and assisted them greatly by his zeal and eloquence. Grateful for his patriotic services, Athens recalled him from exile, sent a ship to convey him to Piræus, and received him with extraordinary enthusiasm. Leonnatus had come from Hellespontine Phrygia with an army of 20,000 foot and 2,500 horse. Antipater, who had succeeded to the command of the allied army after the death of Leosthenes—slain at Lamia in a sally—met him in Thessaly, defeated his army, and slew the leader. Antipater soon after joined the defeated army, and, being reinforced by Craterus with a considerable force from Asia, defeated the allied army near Crannon (322). The allies now sued for peace; but Antipater would only treat with the separate states, and all except Athens speedily laid down their arms. As Antipater marched upon Athens, Phocion was sent in the hope of securing favorable terms. Antipater required that a certain number of the orators, including Demosthenes and Hyperides, should be surrendered, that a property qualification should be required for the franchise, and that a Macedonian garrison should be received into Munychia. On the motion of Demades, the Athenians condemned the orators to death; but they escaped from Athens before the arrival of the Macedonians. They were torn from their sanctuaries by Archias, an officer of Antipater. Demosthenes put an end to his life by taking poison in the temple of Neptune, on the island of Calauria; Hyperides was barbarously put to death at Athens. In the East, quarrels broke out between Perdiccas, the regent, and the other generals of Alexander, who assailed him on all sides. In 321 he marched against Egypt, and was there assassinated by some of his own officers. Antipater was now declared regent, with the government of Macedonia and Greece; Ptolemy continued in the government of Egypt, Seleucus received the satrapy of Babylon, and Antigonus retained his former provinces, Phrygia, Lycia, and Pamphylia, with the addition of Susiana. Antipater died in 318, and was succeeded by Polysperchon as regent, who proclaimed the independence of the Grecian states, and despatched his son Alexander with orders to compel the Macedonian garrison to evacuate Munychia. Phocion took refuge with him, but was sent back in chains to Athens, where in 317 he was put to death with every circumstance of outrage and indignity. Polysperchon being unsuccessful in an expedition in the Peloponnesus,

the Athenians joined the alliance of Cassander, who established an oligarchy at Athens under the government of Demetrius Phalereus. He became master of Macedonia, and in 315 restored Thebes, which had been in ruins since its destruction by Alexander. In the same year a war broke out in the East, but in 311 a peace was concluded, which was violated the next year by Ptolemy. In 307 Antigonus sent his son Demetrius, afterward called Poliorcetes, the besieger of cities, to Athens with a powerful fleet. Demetrius Phalereus was forced to surrender, and returned to Thebes. The ancient constitution was restored, and Demetrius and his father were honored by the addition of 2 new tribes, the Demetrias and Antigonas. In 306 Demetrius, being called away from Athens, gained a great victory over Ptolemy at Salamis in Cyprus. Antigonus, Seleucus, and Lysimachus now assumed the title of king. Demetrius Poliorcetes again returned to Greece, while Cassander was besieging Athens. Cassander retired, and Demetrius was again received with honors. The struggle between Antigonus and his rivals was brought to a close by the battle of Ipsus in Phrygia, in which Antigonus was defeated and slain; after this the Athenians refused to receive Demetrius. Cassander became master of Greece; Seleucus and Lysimachus divided the kingdom of Antigonus. In 300 Demetrius ravaged the Thracian Chersonesus, and formed an alliance with Seleucus, marrying his daughter, and then made another attack upon Athens, driving out the tyrant Lachares. Soon afterward Demetrius conquered Macedonia, distracted by the rival pretensions of the sons of Cassander. He attempted to recover the Asiatic provinces of his father; but Macedonia was invaded by Pyrrhus, king of Epirus, and Lysimachus, and Demetrius was obliged to fly. He died in Syria in 288. The further wars between the successors of Alexander hardly belong to the history of Greece.—In the midst of the Macedonian domination an important movement took place in Achaia, a narrow strip of country on the northern coast of Peloponnesus. A league, chiefly for religious purposes, had existed from ancient times among the cities of this region, and though it had been suppressed by the Macedonians, Aratus of Sicyon revived it in 251 B. C., with a political organization under a chief entitled the strategus, or general, a secretary, and a council of 10 demiurgi, the sovereignty residing in a general assembly composed of citizens who had reached the age of 30, which met twice a year at Ægium. The confederacy rapidly increased in extent and power, but in 227 was involved in a war with Sparta. Aratus was then strategus. He invited assistance from Macedon, then ruled by Antigonus Doson. In 228 he compelled the Spartan king Cleomenes to withdraw to Laconia. In 221 Cleomenes was defeated by Antigonus in the battle of Sellasia. The Ætolians, who had long been united in a league of tribes, made incursions into

Peloponnesus, and coming into collision with the Achæans under Aratus, near Caphysæ, the latter were defeated. This led to an alliance between the Achæans and Philip, the young king of Macedon, in 220. After gaining several victories, he made a peace with the Ætolians in 217. The war between Rome and Carthage now attracted the attention of the Macedonian king, who in 216 concluded a treaty with Hannibal, and went so far as to meditate an invasion of Italy. While laying siege to Apollonia he was attacked by the Roman consul, M. Valerius Lævinus, and compelled to retire. Having differences with Aratus with respect to some of his proceedings in Greece, he caused him to be taken off by poison in 218. In 211 the Romans made an alliance with the Ætolians, and declared war against Philip. They took several islands, which they surrendered to the Ætolians in the course of the year. In 209 the Achæans again solicited the aid of Philip. They were at this time led by Philopœmen, the last of the Greeks, and in 208 he was elected strategus of the league. In 207 he defeated the Lacedæmonians at Mantinea; and as the Romans, having made peace with Philip in 205, retired from Greece, the country was left in a state of tranquillity for several years. But in 200 they declared war against him, and a Roman fleet relieved Athens, which he was besieging; but in retiring he committed great ravages in the suburbs of the city. In 198 the Achæan league joined the Roman alliance, under the influence of the consul T. Quintius Flamininus. In 197 Philip was defeated in the battle of Cynoscephalæ, and peace was made in the following year, the Macedonians being compelled to renounce their supremacy, and to pay 1,000 talents for the expenses of the war. The Ætolians having persuaded Antiochus the Great to come with an army into Greece, he was defeated at Thermopylæ in 191, and the Ætolians were obliged to ask for peace, and to submit to the most humiliating conditions. Philopœmen in the mean time had joined Sparta to the Achæan league; but that city proving intractable, he marched upon it, razed the walls, and compelled the citizens to adopt a democratic constitution. In 188 Philopœmen was taken prisoner by the Messenians, who had revolted from the league, and put to death. In 179 Philip died, and was succeeded by Perseus, who found large preparations made for a renewal of the war with the Romans. In 171 the Romans declared war against him, and the consul L. Æmilius Paulus was sent to Macedonia in 168. The war was ended by the battle of Pydna and the surrender of Perseus, who was carried to Rome to adorn the triumph of his captor. Commissioners were sent from Rome to arrange the affairs of Macedonia; but it was a quarrel between Athens and Oropus which finally gave the Romans an opportunity to bring all Greece into subjection, by destroying the Achæan league. The Oropians complained to the Roman senate; the Romans appointed the Sicyonians arbitrators, and they having condemned

the Athenians to pay a fine of 500 talents, the latter sent an embassy of 8 philosophers, Diogenes the Stoic, Critolaus the Peripatetic, and Carneades the Academic, who succeeded in reducing the fine to 100 talents. Still fresh aggressions occurring, the Oropians appealed to the Achæan league, which, at first declining to interfere, was finally involved by the intrigues of several leading men, among whom was Diæus the strategus, in a quarrel with Sparta. The latter appealed to Rome, and in 147 two commissioners were sent to Greece, who decided that Sparta, Corinth, and the other cities except those of Achaia, should be independent. This decision led to acts of violence; and finally Metellus, marching into Greece, defeated Critolaus the strategus in Locris. Diæus succeeded him; but another Roman force under Mummius landed on the isthmus of Corinth and defeated him in a battle fought near the city. Corinth was taken in 146; the city was burned; the works of art with which it was filled were transported to Rome; 10 commissioners were despatched to settle the condition of Greece, and the whole country became a Roman province under the name of Achaia.—The Romans at first used their power with such moderation as to excite the admiration of Polybius, who was one of the 1,000 Achæans sent to Italy. The religion and the municipal institutions of the Greeks were treated with respect. Their eminence in literature and the arts qualified them to be the teachers of the Romans, who sent their youth to Athens to complete their education under the instruction of the scholars and philosophers of this city, which long retained its preëminence. It was not until the Mithridatic war that the Greeks made an attempt to throw off the Roman power. The losses sustained by Greece in this unhappy period were never repaired. The Cilician pirates soon after ravaged Greece; they were destroyed by Pompey. The civil wars that overturned the Roman republic desolated the fields of Greece; but the empire at length established peace throughout the civilized world. Greece continued to be the school of letters and art. She was still crowded with temples and statues, the products of the best ages. Her schools of philosophy and rhetoric flourished; the forms of public life were maintained, and but little change was made in the municipal administrations. But the dignity and influence of official position gradually sunk in the public estimation under a foreign supremacy. Augustus established military colonies. His successors generally treated Greece with respect, and some of them distinguished her by splendid imperial favors. Trajan even greatly improved her condition by his wise and liberal administration. Hadrian and the Antonines venerated her for her past achievements, and showed their good will by the care they extended to her works of art, and their patronage of the schools. About the middle of the 8d century A. D. hordes of Goths appeared on the frontiers, and soon after covered the Hellespont



and the *Ægean*. Athens was gallantly defended by Dexippus the historian. Among the influences that essentially modified the condition, intellectual and moral, of the people of Greece, was that of Christianity, which was introduced by the apostles themselves, and, from the time of St. Paul's discourse on the Areopagus, had been gaining upon the ancient paganism. The *ecclesia* became the church, and the *liturgia* passed over from the public political offices of the Athenian state to the Christian service in the worship of God. Christianity revived oratory, and improved the intellectual condition of the people. In 330 the seat of the Roman empire was removed to Constantinople, an event which brought Greece into closer relations with the Roman administration, though the local governments were still allowed to exist. The emperor Julian attempted to check the growth of Christianity, and to restore the heathen rites, but with little success. In 395 the separation of the eastern and western empires took place; and as the Greeks naturally belonged to the eastern, they now exercised a more powerful influence on the government. About this time the name Hellenes began to be limited to the adherents of the ancient religion. In the first half of the 5th century Attila and his Huns desolated Greece. In the reign of Justinian (527-565) the philosophical schools of the Greeks in which doctrines adverse to Christianity were taught were closed; but much was done for the protection of Greece from foreign invasion. The western empire fell in 476; but the eastern Roman empire continued until the reign of Leo the Isaurian, A. D. 717, when, according to the most recent authorities, the proper Byzantine period commences. During this period the events which exercised the most important influence upon the condition of Greece were the immigrations of the Slavi and other barbarous races, commencing early in the 6th century. In the early part of the 8th century they occupied a large part of the country, and held possession of the coasts, displacing to a considerable extent the Greek population. But in the course of time they retreated, and the country was mainly restored to the descendants of its ancient inhabitants. Yet to this day the effects of these Slavic settlements are witnessed in the physical character of the people in some districts, especially of Peloponnesus. Numerous traces of them are detected in Slavic names of persons and places, and in Slavic words still found in the language of the common people. But the theory advanced by the German Fallmerayer, that the Greek people wholly disappeared from Greece, and that the present inhabitants are Slavi, will not stand a moment's investigation. As Mr. Finlay, the eminent historian, truly remarks: "The Greeks are the only existing representatives of the ancient world. They have maintained possession of their country, their language, and their social organization, against physical and moral forces which have swept from the face of the earth all their early contempo-

raries, friends and enemies." No important change occurred from this time until the conquests by the Normans in the 11th century. Robert Guiscard landed in Corfu in 1081. Bohemund invaded Greece soon after. In 1148 Roger, king of Sicily, mastered Corfu, and, marching through the mainland, plundered Corinth, Thebes, and Athens. In the 4th crusade, commencing in 1203, Constantinople was taken by the Latin princes, who also divided Greece among them. The marquis of Montferrat became sovereign of Salonica (Thessalonica); Achaia and the Morea (Peloponnesus) became a principality under William de Champlitte and Geoffroi Villehardouin; a dukedom was established in the archipelago and Naxos; but the most remarkable of these Frankish establishments was the dukedom of Athens, existing from A. D. 1205 to 1456. All these Frankish governments were swept away by the Turks, who, having captured Constantinople in 1453, in a few years thereafter extended their conquests over Greece, and incorporated it into the Turkish empire. It was organized into pashalics, mousemilics, agalics, and vaivodalics, all subject to a supreme magistrate called Rumeli Valesi, or grand judge of Roumelia. Some of the more mountainous regions were never thoroughly subject to the Turks, but maintained a rude independence. Under the Turkish system of administration the country sunk gradually to a most miserable condition. The Greek islands, being left more to themselves, suffered less from the rapacity and barbarism of their masters. But there were several causes which tended to preserve the Greek nationality, under this foreign and most oppressive domination. The domestic institutions and the religion of the Turks were objects of such abhorrence to the Christian Greeks that no amalgamation of the two races could take place. The Greeks cherished an inextinguishable devotion to their church, the foundation of which they traced directly to the times of the apostles, while the hymns and liturgies were the work of the most eminent of the Christian fathers. In this state of mutual repulsion, and of barbarous oppression of the superior by the inferior race, nearly 4 centuries passed away, with only a few spasmodic efforts to break the yoke of the tyrant. But the Turkish sultans, almost from the beginning of their establishment at Constantinople, were obliged to employ Greeks in several important branches of the public service. Greek mercantile houses were established in the principal cities of Europe, and the eminent abilities of the race were shown by their great success in every department of commerce. In western Europe, a revival of the taste for Greek literature was brought about by the presence of learned Greeks who fled from Constantinople at the time of its capture. In the last half of the 18th century, the spirit of nationality and the desire of independence received a strong impulse throughout the Hellenic race. Education was everywhere promo-

ted; a secret society was formed called the *Hetaeria*, the object of which was the emancipation of the country. Eminent writers—Rhegas, and later, Coray—appealed to the glorious recollections of Greece, and excited a universal enthusiasm for freedom. These preparations continued in the first quarter of the 19th century; and the insurrection, long looked for, broke out in 1821. The war lasted 7 years, and was one of the most remarkable struggles recorded in history. In 1822 a provisional constitution was framed by a national assembly held at Epidaurus, and a proclamation of independence solemnly published to the world. The contest was carried on in the most barbarous manner by the Turks. The bloodshed at Constantinople, the execution of the patriarch, the massacres of Scio, showed the Christian nations what sort of enemies the Greeks had to encounter, and excited for them the deepest sympathies. On the other hand, the Greeks seldom imitated the atrocities of their oppressors. They exhibited the noblest qualities of character, bravery, patience under suffering, unconquerable resolution. Year after year their country was ravaged by swarthy hordes from Asia Minor or Egypt, its resources were exhausted, its towns and villages destroyed, its remaining inhabitants reduced to the extremity of poverty, compelled to feed upon roots and leaves, and to live in the caves of the mountains. But brave men joined their cause from Europe and America; contributions of money, provisions, and clothes were forwarded; eloquent voices—those of Webster, Clay, Everett in America—were raised for them; Byron, himself a host, joined them; and notwithstanding the hostile politics of the holy alliance, the Hellenic cause—the cause of Christianity, of nationality, of justice—finally triumphed. The battle of Navarino, Oct. 29, 1827, in which the combined squadrons of England, France, and Russia annihilated the Turco-Egyptian fleet, was the decisive event; and notwithstanding his obstinate determination to persevere, the sultan was compelled to come to terms. Count Capo d'Istria, a distinguished Greek statesman, then in the service of Russia, was chosen president, and arrived in Greece in the beginning of 1828. Hostilities ceased the following year. The great powers now occupied themselves with the settlement of Greece. They selected Prince Leopold, now king of Belgium, as sovereign of the emancipated state; he at first accepted the offer, but, owing to a difference on the question of boundaries, abdicated the unoccupied throne 4 months afterward. In Oct. 1831, President Capo d'Istria was assassinated at Nauplia, and 6 months of anarchy followed. The great powers then fixed upon Otho, the second son of the king of Bavaria, a prince then (1832) only 17 years old. He assumed the government, under the direction of a regency, and arrived at Nauplia in 1833. The boundaries of the kingdom of Greece were determined by a treaty between the great powers and the Porte in 1832. The

northern line runs from the gulf of Volo (the Pagassæan) along the chain of Othrys to the gulf of Arta (the Ambracian). The eastern line includes Eubœa, the northern Sporades, and the Cyclades. Candia (Crete) was ceded to the pasha of Egypt; it is now restored to the Porte. The island of Cerigo (Cythera), and those along the western coast, form the Sept-insular or Ionian republic, still under the protectorate of England. Greece was divided into 10 *nomoi* or provinces, subdivided into 80 *eparchiai*, and 453 *demoi*. The first province embraces Attica and Bœotia; the 2d, Phocis and Phthiotis; the 3d, Ætolia and Acarnania; the 4th, Argolis and Corinth; the 5th, Achaia and Elis; the 6th, Arcadia; the 7th, Messenia; the 8th, Laconia; the 9th, Eubœa and the northern Sporades; the 10th, the Cyclades. The seat of government was first established at Nauplia; but in 1835 it was transferred to Athens, where the king, after his marriage with the princess Amalia of Oldenburg, took up his residence and established his court. After attaining his majority in 1835 the king governed in his own name, by ministers responsible to himself, aided by a council of state. The treaty said nothing about a constitution, though the Greeks expected one, and were disappointed not to receive it immediately. The king's government was despotic in principle, but mild and equitable so far as depended on himself. This state of things was not satisfactory. The Greeks have always been lovers of political discussion, and the public administration of justice. The principles of despotism, however mildly applied, are distasteful to them, and wholly alien from their nature. It was impossible that they should continue peaceably under the German system. They waited 10 years, and then, the popular dissatisfaction reaching its height, the palace was surrounded on the night of Sept. 14, 1843, by the army and the people, demanding of the king a constitution. After some hesitation the king yielded, and a political revolution was effected, without shedding a drop of blood or committing a single act of violence. A national assembly was convoked, and a constitution, the result of their labors, was laid before the king on March 4, 1844. It received his sanction on the 16th of the same month, and has ever since been the fundamental law of the kingdom. It establishes a hereditary kingdom, the oriental church, with toleration of all others, and personal equality before the laws; forbids slavery in every form; organizes education at the public charge; divides the legislative power between the king, a chamber of deputies elected by the people, and a senate for life; ordains the responsibility of ministers; provides for the freedom of the press, the open administration of justice, the trial by jury, and the independence of the judiciary. Many important facts in the history of modern Greece are detailed in the article *ATHENS*.—The population in 1858 was 1,067,216, about 800,000 of whom are Greeks proper, 200,000 Albanese, and the

rest Turks, Jews, Armenians, Italians, Germans, &c. The Roman Catholics number about 70,000, with 1 archbishopric, 4 bishoprics, about 100 priests and monks, 48 churches, 9 convents, and 2 seminaries. The established religion is the Greek church, and although King Otho himself is a Roman Catholic, the crown can descend only to a member of the national church. In 1829, 800 Greek monasteries were closed, and their estates appropriated for churches and schools. About 80 still remain, with nearly 200 inmates. In 1833 there were 80 nunneries, with about 150 nuns. The educational institutions consisted in 1856 of the Athens university, 11 gymnasia, 98 public and private common schools, 800 private and 450 public primary schools, a normal and polytechnic school, a divinity school, a female college, and excellent American female schools in Athens, 2 naval schools in Nauplia and Syra, an agricultural school near Nauplia, &c. The foundation of a new academy, endowed by the Greek banker Sina of Vienna, was laid in Athens in Aug. 1859. There are also many scientific, literary, and artistic institutions, libraries, and museums, chiefly in the capital. About 100 political, religious, and literary newspapers and periodicals are published in Greece. The Athens daily political journals best known abroad are the *Elpis*, *Aion*, and *Spectateur de l'Orient*. For the administration of justice there are a supreme court, 2 courts of appeal, 8 commercial courts, 10 civil and criminal courts, 120 justices' courts with jury trials, &c. Capital punishment was introduced by the penal code in 1837. The instrument of execution is the guillotine. The revenue for 1858 was estimated at 18,275,807 drachmas, and the expenditure at 17,946,849, comprising about 5,000,000 for the army. The public debt in 1856 was 112,500,000 drachmas, a great part of which is guaranteed by Great Britain, France, and Russia. The army numbers 9,686 men and 687 horses; the navy 27 vessels and 149 guns; and the commercial marine, 4,379 vessels, of 825,000 tons, and 26,000 men. The entrances in the Piræus in 1855 comprised 814 vessels, tonnage 229,412, and the clearances 595, tonnage 173,786. The cultivated land in 1854 comprised 8,649,870 stremmata in cereals, 1,000,000 in vines, 600,000 olive trees, 240,000 mulberry trees, and 150,000 fig trees. Of domestic animals there were 5,600,000 sheep and goats, 160,000 oxen, 90,000 horses, 30,000 mules, 7,000 asses, and 2,000 buffaloes. The product of wheat was 2,669,000 kilos, maize 2,830,000, barley 1,223,600, oats and other grains 1,539,000; of currants 60,000,000 okeas, wine 16,200,000, oil 1,600,000, wool 1,500,000, silk 70,000, and valonia 14,000. The crops of 1858-'56 yielded on an average 6,500,000 kilos, which was insufficient for the home consumption, and grain to the amount of about \$800,000 was annually imported. The total value of imports in 1856 was about 25,000,000 drachmas, and of exports 14,000,000. The exports to the United States in the year ending June 30, 1858, amount-

ed to \$132,907. A national bank was founded at Athens in 1842, which from 1849 to 1854 has paid an annual dividend of  $8\frac{1}{2}$  to  $9\frac{1}{2}$  per cent. Athens is the seat of a steamboat company communicating with Trieste and Constantinople. In 1857 it had 9 steamers, tonnage 11,300. New public roads to the extent of 233 m. were completed in 1856, and a railway is in course of construction by which Athens will soon be connected with the Piræus. Submarine telegraphs are in operation between Athens, Syra, Chios, Constantinople, and Crete. Between 1831 and 1855 commercial treaties were concluded with the United States, Austria, Hamburg, Prussia, Belgium, Saxony, Bremen, Denmark, Holland, Hanover, Russia, Sardinia, and Turkey.—The unity of weight in Greece is the oke, divided into 400 orams, one oke being equal to about 2 lbs. 14 oz. avoirdupois. The unity of long measure is the pic, equal to about  $26\frac{1}{4}$  inches English. Land is measured by the same standard, 1,000 square pics being equal to 1 stremma. Grain is generally measured by the kilo (the only legal measure), of which 231 are equal to 237 New York bushels. The drachma is divided into 100 lepta, 5.78 drachmas being equivalent to \$1.—For an account of Greek art, see ARCHITECTURE, PAINTING, and SCULPTURE.—On the geography of Greece, the following works may be especially consulted: C. Mannert, *Geographie der Griechen und Römer* (10 vols. 8vo., Nuremberg, 1792-1825; vols. vii., viii. on Greece, Thrace, and Macedonia); Sir Wm. Gell, "Itinerary of Greece" (4to., London, 1810); F. K. G. Kruse, *Hellas* (2 vols. 8vo., Leipzig, 1826); J. A. Oramer, "Geographical and Historical Description of Ancient Greece" (3 vols. 8vo., Oxford, 1828); "Travels in Northern Greece" (4 vols. 8vo., London, 1835), and "Peloponnesiaca" (8vo., 1846); W. M. Leake, "The Topography of Athens" (2d ed., 2 vols. 8vo., London, 1841); Charles Anthon, "A System of Ancient and Mediæval Geography" (New York, 1850); J. R. Rangabe, *Ta Ἑλληνικά* (3 vols. 8vo., Athens, 1858-'5); A. L. Kœppen, "The World in the Middle Ages, an Historical Geography" (4to., New York, 1854); William Smith, "Dictionary of Greek and Roman Geography" (2 vols. 8vo., London and Boston, 1854-'7), &c.—On the history of Greece, beside the works of Goldsmith and Gillies, see Pogueville, *Histoire de la régénération de la Grèce* (4 vols. 8vo., Paris, 1740); Jacovaki Rizo Neroulos, *Histoire de la Grèce moderne* (8vo., Geneva, 1838); Alexander Sutz, *Histoire de la révolution Grecque* (8vo., Paris, 1829); J. W. Zinkeisen, *Geschichte Griechenlands* (3 vols. 8vo., Leipzig, 1832-'40); the Rev. Connop Thirlwall, "Greece" (8 vols. 12mo., in Lardner's "Cabinet Cyclopædia," London, 1835-'44); William Mitford, "The History of Greece" (8 vols. 8vo., London, 1838; republished in Boston); Sir James Emerson Tennent, "History of Modern Greece" (2 vols. 8vo., London, 1845); Thomas Gordon, "History of the Greek Revolution" (2 vols. 8vo., 1845); George Grote, "A History of Greece" (12 vols. 8vo., London, 1846-'56);

the best of all); George Finlay, "History of Greece under the Romans, in the Middle Ages, and in Modern Times"—"History of Greece under Foreign Domination," viz.: 1, "Greece under the Romans" (2d ed., 8vo., 1857); 2, "The History of Greece from its Conquest by the Crusaders to its Conquest by the Turks, and of the Empire of Trebizond" (1851); 3, "History of the Byzantine Empire, from A. D. 716 to 1057" (1853); 4, "History of the Byzantine and Greek Empires, from 1057 to 1453" (1854); 5, "The History of Greece under Ottoman and Venetian Domination;" S. Tricoupea, *Ἱστορία τῆς Ἑλληνικῆς Εὐρωπαϊκῆς* ("History of the Greek Revolution," 4 vols. 8vo., London, 1853-'6). A very important work, for history, chronology, and literature, is the *Fasti Hellenici*, by H. F. Clinton (8 vols. 4to., Oxford, 1880-'41). To these may be added the works of Dr. S. G. Howe, Strong, Palmer, Blaguière, and others; and of Wordsworth, Mure, Gifford, Lord Carlisle, senior, and numerous other English travellers, as well as the topographical works of the German Forchhammer, and the travels of the German professors Ross, Ulrichs, and others. There are numerous contributions to Greek history made every year by the industrious scholars of Greece. The "History of Souli," and the "Military Memoirs" of Perrhæbos, are valuable.

**GREECE, LANGUAGE AND LITERATURE OF.** The origin of the Greek language, like that of the people who spoke it, is hidden in the mists that precede history. The Pelasgi, whom Kruse supposed to be Etruscans, Kreuser Phœnicians, and others aborigines of Greece, are reported by Herodotus to have spoken a barbarous language, or one that was unintelligible to the Greeks in his time. No Greek has furnished us with any data for ascertaining the parentage of the language, although Plato suspected its connection with the barbarian tongues. Alstedius in the 17th century derives the Greek from the Hebrew, and the people from Javan, the son of Japhet; Webb (1788) from the Chinese; Monbodo from Egypt, believing that the Pelasgi were Goths. Martin and Buffier assert that the Phœnician Cadmus altered the language in the north, and the Phrygian Pelops in the south. O. Rudbeck and Ihre derive it from the Gothic (especially the infinitive ending *en* from *an*, Germ. *en*, and the adjective ending *u-er* from *aga*, *eiga*, Germ. *ig*, *ich*), while Jamison holds to the reverse.—The autochthones of Greece mingled with immigrants from Asia, a part of whom had come along the northern shore of the Black sea, through Dacia, Mœsia, and Thrace, and another part by sea. The sanctuaries of Dodona and of Delphi promoted the fusion of the different tribes into a new nation. The Greek language is most akin to the ancient Italic tongues, the Umbro-Sabellian, Oscan, and Latin, and forms one of the 8 groups (Sanskrit, Zend, Persian, Greek, Latin, Celtic, German, and Slavo-Lithuanian) of the Indo-European family of languages. Its antiquity, its

intrinsic excellence, its literature, and its influence on the progress of the fairest portion of mankind, challenge our undivided admiration. It is rich in roots, flexible in the formation of words, picturesque in its modes of expressing thought, highly plastic and euphonious, both simple and sublime in the Homeric poems, playful in Anacreon, majestic in Æschylus and Pindar, noble in Sophocles, pathetic in Euripides, elegant in Xenophon, subtle in the sophists, distinct in the stoics, clear in Aristotle, and fluent in the orators. Its syntax is free, full of inversions, subtle and perfect, yet without obscurity. Its geographical extent appears from the enumeration of its dialects. These were produced by diversities of origin, of residence, and of vicissitudes in the several portions of the Hellenic people. Although nearly every district and town had its own idiosyncrasies, and although the people spoke variously, both before and after the development of the dialects in writing, learned men of comparatively modern times have divided the Greek language into 4 principal dialects, viz.: I. The Doric (*Δωρίς*), spoken in the greatest part of the Peloponnesus after the Doric invasion, in the Tetrapolis, in the Doric colonies of Asia Minor, in Rhodes, Crete, and most of the islands of the archipelago, in Magna Græcia, and in Sicily. It was rough, hard, broad, with long a predominant over all the other vowels (*πλατειασμος*), and with the frequent occurrence of *δ* (*δωτακισμος*) in Elis; it was purest in Messenia, and softest in Syracuse and Agrigentum. Its centre was in Sparta, where it was preserved with the utmost tenacity. It is found in Pindar, milder in Theocritus, in Bion and Moschus, in the choruses of the dramatists, in some mathematical fragments, and in those of Pythagoras. II. The Æolic (*Αἰολίς*), more ancient than the preceding; spoken N. of the isthmus of Corinth (with the exception of Megaria, Attica, and Doris), in the Æolic colonies of Asia Minor, and on some islands of the Ægean sea. It was refined very early, and was less harsh than the Doric, although also broad. It contains some Pelasgic forms, and varies with time and localities, as in the fragments of Sappho (*Æolic*, *Ψαπφα*), Myrtis, and Alcæus, all three of Lesbos, in those of Corinna of Bœotia, in the idioms of Thessaly and Ætolia. Homer called it the language of gods. We have a few remains of Æolic inscriptions. The digamma (F) was most prominent in this dialect, which, together with the Doric, is nearest to the Latin. III. The Ionic (*Ἰατ*), the first of all as regards the age of its cultivation, spoken originally on the sea shores of Attica, Achaia, and northern Argolis. Transported with Attic and Achaean colonies into Asia Minor, it was there developed earlier than in Europe. Herodotus speaks of 4 varieties of it in Ionia, and there must have been others elsewhere. It is the softest and most musical of all the dialects; it multiplies vowels, it lengthens the short ones, abounds in diphthongs, and is averse to contractions; it some-

times rejects initial consonants, and avoids gutturals, being partial to labials and linguals. It was the common literary language of the Asiatic Greeks, with some exceptions. The *Iliad* and *Odyssey* and other poems attributed to Homer are written in it; hence it is named the Homeric or epic language, and was as such diffused through all the countries inhabited by the Greeks. Many epopees, as for instance the *Κυπρια ἐπη*, the *Iliaca* (on the fall of Troy), the *Νοστοί* (returns home), the *Thebaida*, *Atthidea*, and *Minyades*, were composed in this dialect. Hesiod, though a Boeotian, the elegiac Megarian Theognis, Anacreon, Herodotus, though of Doric descent, Hippocrates of Cos, Tyrtæus, Callinus, Mimnermus, &c., belong to the later period of this dialect, which yet lived in the speech of the people in the 2d century B. C. IV. The Attic (*Ἀττικὴ*) anciently differed but little from the Ionic, and was developed by contact with barbarian tongues, without losing its essential qualities. This dialect sprang from the Ionic chiefly after the Persian wars, under the protection of unlimited democracy, and it attained its acme in the drama, in philosophy, oratory, and historiography. Holding a middle place between *Æolo-Doric* hardness and Ionic softness, powerful, harmonious, and of a concise syntax, it became, so to say, the language of Greece. *Æschylus*, *Sophocles*, *Euripides*, *Thucydides*, *Aristophanes*, *Plato*, *Demosthenes*, and *Isocrates*, rendered it immortal.—The Greeks have no common name in Homer, and were first called *Hellenes*, and their language *Ἑλληνικὴ γλῶσσα*, at a later day. Although the Attic ceased to be the literary language under the Romans, learned men frequently wrote in it. *Æolic* and *Doric* poems were also composed for some time after the muses had become mute, in the same way as Latin was and is yet employed in Europe. The conquests of Alexander widened the area of the Greek language. Grammarians then began to counteract its degeneration by fixing the rules of Atticism, stopping all further natural development, and rendering it pedantic. Thus arose the *κοινὴ Ἑλληνικὴ γλῶσσα*, or common Hellenic tongue of our grammars. The writers, whether Athenians or not, were thence called *κοῖνοι* or *Ἕλληνες*. Among them are Aristotle of Stagira, Theophrastus of Eresus, Apollodorus, Diodorus Siculus, Plutarch from Boeotia, and Polybius. Then follow the Atticists, who endeavored to write the genuine Attic, as Lucian of Samosata, *Ælian* of Præneste, and Arrianus of Nicomedia. Beside the above dialects, there arose the following in progress of time: the Macedonian, of Doric origin, anciently unintelligible to the southern Greeks, and afterward absorbed by the common tongue; the Alexandrian; the Hellenistic, or dialect of foreigners, such as Syrians and Jews, corrupted by their idiotisms, and found in the Septuagint version of the Hebrew writings, in the New Testament, and in Josephus; the ecclesiastic of the fathers of the church; and the Byzantine, employed by the

government and in private transactions, full of barbarisms, especially after Alexandria had been taken by the Saracens. From an admixture of Slavic, Skipetaric or Albanian, Turkish, Italian, and other elements, the modern Greek language (see below) grew up, under the names of *ἀπλο-Ἑλληνικὴ*, or simple Hellenic, *πνε-Ἑλληνικὴ γυδαία*, vulgar, *καθολομένη*, spoken, or *Ῥωμαϊκὴ*, Romaic, so called either because the Turks gave that name to the Byzantine empire, or because the Greeks abhorred the name of Hellenic as redolent of paganism. For a fuller account of the dialects, see Ahrens, *De Dialectis Græcis* (Göttingen, 1839-'48). For the history of the Greek language, see G. Burton (London, 1657); L. Ingewald Elingius (Leipsic, 1691); L. Reinhard, *Historia Critica Litterarum* (Leipsic, 1728); Th. Oh. Harless, *Introductio in Historiam*, &c., vol. iii. (Altenburg, 1778).—Many Greek roots, as for example those of numerals and of pronouns, coincide with those of the Sanscrit and other kindred languages. The formative elements of conjugation, declension, and derivation are analogous. Many words differ from those in Sanscrit merely by accent or aspiration. Out of 11,638 Greek words, Pott found 2,065 to be Sanscrit, 800 Lithuanian, 798 German, 648 Latin, 526 Slavic, 327 Celtic, 292 Gothic, 138 Zend, 40 Russian, and 36 Armenian. The Sanscrit has like the Greek 3 genders and 3 numbers. The Greek conjugation is richer in tenses than the Latin. The ancients counted 13 forms of Greek verbs, which are reducible to 2, viz.: 1, those ending in the 1st person singular of the present indicative in *μ*; and 2, those ending in *ω*. The characteristic letters of the persons of the verb in Greek, Latin, Sanscrit, Lithuanian, Slavic, and Gothic are, *-m* for I, we; *-s* for thou, you; *-t* for they. The 2d aorist (akin to the French *passé défini*, notwithstanding the radical difference of the signification) is the root, when deprived of the accessories of conjugation. The 1st aorist, though it occurs more frequently, appears to be of later formation. The Greek optative consists of secondary tenses of the subjunctive. The infinitive is often used as a substantive noun, and has 3 tenses like the participles. Most tenses of the passive and middle voices coincide. The middle voice has a kind of reflective, reciprocal, or deponent character.—There are 24 letters in the Greek alphabet. Of these, 16 are commonly attributed to the Phœnician Cadmus (about 1500 B. C.), viz.: A, B, Γ, Δ, E, I, K, Λ, M, N, O, Π, P, Σ, T, Y; 4, according to Pliny, to Palamedes (at the time of the Trojan war), viz.: Θ, Ξ, Φ, X; and 4 to Simonides of Cos (during the Persian war), viz.: Z, H, Ψ, Ω. The Θ and X are also ascribed to Epicharmus of Sicily. According to Aristotle, there were originally 18 letters, namely, the Cadmeian 16 and Z, Φ. Those 16 were also called Athenian letters. According to Eusebius, Palamedes invented the 16, Cadmus added Θ, Φ, X, Simonides H, Ω, and Epicharmus Z, Ξ, Ψ. It is, however, more probable that the first letters, of

Phœnicio-Babylonian origin, in imitation of phonetic hieroglyphs, were those of the ancient Phœnician and Hebrew alphabets, called also Ionian letters. Out of this alphabet the following 3 letters were ejected, and used as numeral signs, viz.: the 6th, Βαυ (or F, called the *Æolic digamma*, found on Achæan and Bœotian coins, also σ as ρ, stigma); the 19th, *qoppa* (whence our Q, on coins of Crotona and Syracuse, as a numeral standing for 90); and the σαυ *κεβηλα* (in Pindar, an impure S, from which arose the Σ, *sampi*, as a numeral standing for 900). The two other Semitic sibilants were converted into Ξ (the *samech*) and Σ (the *shin* and *sin*). That H and Ω were known before Simonides appears from inscriptions at Abusimbel in Egypt. The ancient letters were all uncial, or what we call capital; the present cursive or round letters occur first in inscriptions of the age of Augustus, and resemble the Coptic shapes. Negligently written, with many contractions, they occur also in notes written on Egyptian papyri, with the mystic scrolls of the Abraxas; also in the manuscript Colbertin code of the Pentateuch, in manuscripts of Dioscorides (of the 6th century A. D.), and in others. The H was originally what it is now with us. (See letter H.) The spiritus signs were first employed in the grammatical works of Alexandrine scholars. The present cursive characters, with many ligatures, have been in common use since the 10th century A. D. The Greeks wrote originally from right to left, afterward alternately both ways, and lastly from left to right. As the precise pronunciation, in all its shades, cannot now be reproduced, we must be satisfied with an approximate phonetic value of the letters. Reuchlin and the modern Greeks pronounce the vowels ι, η, υ, and the diphthongs ει, αι, υι, all like the Italian *i* (being hence called *Itacists*); the αι like the Italian *e*; and the diphthongs αυ, ευ, like *af*, *ef*, or *av*, *ev*. But Erasmus ought rather to be followed, as he distinguishes those letters by sounds, preserves the diphthongs, and thus shows both more respect for the common sense of the ancient Greeks, and more regard for etymological truth as well as euphony. He and his followers are called *Etacists*.—Plato's *Cratylus* is the first important attempt toward an investigation of the origin and essential elements of the Greek language. Aristotle treats of several topics connected especially with logic in speech. The Megaric stoics also paid attention to this subject. The most prominent grammarians were the following: Aristophanes Byzantinus (about 260 B. C.), librarian of the Ptolemies, founder of a school of critics, fragments of whose writings were edited by August Nauck (Halle, 1848); Aristarchus of Samothrace, teacher of the Ptolemies, the greatest of all critics, who had also a school at Rome, arranged and corrected Homer's and other ancient works, and established the 8 parts of speech; Crates, founder of a school at Pergamus, who developed the anomalies of the language; Dionysius

Thrax (80 B. C.), author of a grammar that became the standard for succeeding ones (edited by Immanuel Bekker, and more completely by Cirioid, from an Armenian manuscript, Paris, 1824); Apollonius Dyscolos, called the prince of grammarians (under Hadrian), author of *De Constructione Orationis libri IV.* (edited by I. Bekker, Berlin, 1817; *De Pronomine*, 1811; and by Lange, *Das System der Syntax*, &c., Göttingen, 1858); Ælius Herodianus, his son (A. D. 300); Dracon and Hephæstion, who wrote on prosody (edited by G. Hermann, Leipsic, 1812); Theodosius Alexandrinus, author of a treatise on grammar (edited by Götting, Leipsic, 1832); Ammonius and Helladius of Alexandria (end of 4th century), *De Differentiis Affinium Vocabulorum* (edited by G. H. Schaefer, Leipsic, 1822); Georgius Chibrosceus (end of 6th century), *De Figuris Poeticis, Oratoriis, et Theologicis*. Portions of these, as well as the whole works or fragments of other grammarians, were edited by I. Bekker (8 vols., Berlin, 1814-'21); L. Bachmann, from manuscripts in the royal library at Paris (2 vols., Leipsic, 1828-'9); J. A. Cramer, from manuscripts at Oxford (4 vols., 1835-'7); all three under the title of *Anecdota Græca*. See also *Grammatici Græci*, edited by Guil. Dindorf (Leipsic, 1835); Classen, *De Grammaticis Græcis Primordiis* (Bonn, 1829); Rud. Schmidt, *Stoicorum Grammatica* (Göttingen, 1838); Séguier, *La philosophie de la langue exposée d'après Aristote* (Paris, 1838); Lersch, *Sprachlehre der Alten* (8 vols., Bonn, 1839-'41). Shortly before the fall of Constantinople (1453) learned Greeks began to emigrate to the western countries of Europe, especially to Italy. Manuel Chrysoloras, who had sought for help against the Turks in England in 1389, taught Greek in Italy, and died (1415) while at the council of Constance; his *Erotemata Grammatica* were printed in 1488. Georgius Gemistius, surnamed Plethon (full of science), was at the council of Florence (1489), and tried to supplant Aristotle by recommending Plato's works; he was the instructor of Cardinal Bessarion. Constantine Lascaris came to Italy after the capture of Constantinople, and taught Bembo, the daughter of Sforza, and others; his grammar, written in Greek, is the first book that was printed in Greek characters (Milan, 1476); it was reprinted by Aldus Manutius (Venice, 1494). Theodore Gaza of Thessalonica taught also in Italy, and wrote (in Greek) *Introductionis Grammaticæ libri IV.* (Venice, 1495). Emmanuel Moschopoulos, George Hermonymos, and others, also taught and wrote in Italy. Among the disciples of these worthies may be mentioned Politianus, Marcellus Ficinus, Reuchlin, &c. The fruits of this revival of Greek were the following: Aldus Manutius, *Grammatica Institutiones* (Venice, 1515); Nic. Clénard, *Institutiones Linguae Græcæ* (Louvain, 1530); Varenus, *Syntax* (1582); G. Budæus, *Commentarii Linguae Græcæ* (Paris, 1548); J. Camerarius, *Commentarii Linguae Græcæ* (Basel, 1551); Vergara's Grammar, abridged by Nufiez de Valencia (1555); *Hellenismus Ca-*

ninii (Paris, 1555); Ramus, *Grammatica* (1557); W. Camden, *Grammatica Græca Institutio* (London, 1591); Claude Lancelot, *Nouvelle méthode pour apprendre la langue Grecque, dite Grammaire de Port-Royal* (Paris, 1655); Jacob Weller, *Grammatica Græca* (Amsterdam, 1696); J. F. Fischer, *Animadversiones in Welleri Grammaticam Græcam* (1798-1801). The so called *Hallesche Grammatik* (1705) and *Märkische Grammatik* (1780) were much used in Germany. Melancthon also published a Greek grammar. In Holland the following great critics may be mentioned: L. O. Valckenaer, who taught the method of finding Greek roots; Dan. a Lennep, author of *Prolectiones Academicæ de Analogia Linguae Græcæ* (1790); Tiberius Hemsterhuis, Ruhnken, D'Orville, &c. Prominent among English writers are Richard Bentley, who discovered many great features of the Greek language; Toup, who corrected the lexicon of Suidas; and Dawes, who established many important rules of syntax. The work of J. G. J. Hermann, *De Emendanda Ratione Grammaticæ Græcæ* (Leipzig, 1801), opened a new path in this study. In general, the French are far behind the Germans and English in the study of Greek, although the French government supports a chair for this purpose at Athens. (For an account of the principal Greek lexicons, see DICTIONARY.)—The modern Greeks assert that their tongue differs less from the ancient than the Italian from the Latin, and that it is not less analogous to the Hellenic than was the Doric to the Attic dialect. On the islands of the archipelago and in the mountainous regions of Greece, many archaic turns, Homeric expressions, and classic words are yet preserved, though often wrongly written, that do not occur in the idioms of cities, and some not even in the later classic writers. It is probable that many of the contractions, suppressions of endings, and other features of the modern language existed during the most flourishing period of Greece. Christianity also contributed much to the alteration of the ancient Hellenic tongue, in the same way as it did in producing the Coptic from the language of the Pharaohs. Romainic is spoken in Livadia and Morea, in parts of Roumelia, Albania (mixed with Skipetario), Anatolia, in the archipelago, Candia, Cyprus, the Ionic islands, where it is very much Italianized, as in Morea, and even in Wallachia and Moldavia, where it is mixed with Bulgarian. It is least degenerated in the archipelago and in the mountains, less pure in Megaris, and most corrupt in the Ionic islands. Its dialects, about 72 in number, may be thus grouped: α, Romeika, with variations at Constantinople (Fanariotic), Salonica, Janina, Athens, and Hydra; β, Æolo-Doric, in Eleuthero-Laonia, in Candia, where it is cultivated in books, and in Cyprus. Its vocabulary consists of 5 categories: 1, ancient words, either with their former or with an altered signification; 2, ancient words with more or less preserved forms, as diminutives, *βοιδιον*, ox, *αγιδιον*, goat, *φιδι*, snake; 3, ancient words

not found in the classics, for instance some names of animals and plants, as *το τρυγον*, turtle dove, *δολιαιγγο*, snail; 4, new words derived from the ancient, as *πυρκαϊα*, Lat. *incendium*, Germ. *Feuers-brunst*; *το φερσιμον*, moral conduct; 5, barbarous words, as *λανουαριος*, *εβρουαριος*, &c., names of months; *η φραβδα*, strawberry, Lat. *fragum*; *το τζελοσυμο*, jessamine; *δ περιγγης*, the prince; *δ μπαξος*, box on the ear (from *battre*), French *soufflet*; *χατζη*, pilgrim, from *Hadji*, Arabic; *η μαϊμον*, monkey, Magyar *majom*. The letters and orthographic signs are the same as in the ancient Greek; but the spiritus and iota subscript are effete, and the three accents produce but one effect of stress on one of the 8 final syllables of the word. B sounds like our *v*, γ (unless before gutturals) almost like *h*, δ like the Spanish final *d* in *salud*, ζ like the French *z*, θ like our *th* in thick, κ before τ like German *ch*, and after γ and after a final ν like hard *g*; σ is hard, unless before μ; the combination *ντ* like our *d* (as in ancient Egyptian); *μπ* like our *b*; *ου* like the Italian *u*. In consequence of the *συνηρησις* or fusion of vowels, which is popular and poetic, the number of syllables in a word is diminished, thus: *παιδια*, children, is pronounced *pedya*, in 2 syllables; *ενοιωσα*, I perceived, *εnniyosa* (like French *gns* in *campagne*), in 3 syllables. The modern Greek has no dative, dual, optative, infinitive, middle voice, preterite perfect or pluperfect, or future, but employs instead periphrases by means of auxiliaries, &c. Many verbs of active form have a passive signification, except the past participle, as *οπαω*, I am strangled, *εσπασα*, *οπασμενοι*. There is an indefinite article, *ενας*, a, an; and a very inelegant relative pronoun, *ουτου*; and *ουτω* signifies both *is* and *are*. The pluperfect tense is made by the imperfect of *εχω*, to have. The optative is supplied by the conjunction *αμποτε*. The 3d person of both numbers of the imperative is similar to our *let*, thus: *ας* (allow) *γραφη*, as *γραφωμεν*, *scribito*, *scribunto*. The future auxiliary is *δελω*, I will; the conditional is made with its imperfect, thus: *ηδελω γραφην*, I would (should) write. The remains of the ancient forms are now anomalies. The syntax is uniform, dull, but clear, in consequence of the loss of many ancient particles.—An easily accessible manual for commencing the study of the modern Greek is the "Romainic Grammar with a Chrestomathy and Vocabulary," by E. A. Sophocles (Hartford, 1842). The most convenient lexicon is perhaps that of Dehèque, *Dictionnaire Grec-moderne-Français* (Paris, 1825).—LITERATURE. In its widest extent, the history of Greek literature is coeval with that of the language. It begins in a period of indefinite antiquity, and comes down to the present day. If we commence with the earliest monuments, we trace it back nearly to 1000 B. C., where we find the art of poetical composition existing already in the highest perfection, in the form of epic narrative. The admirable structure and the wonderful language

of the Homeric poems imply a long period of antecedent culture, striking intimations of which are found in the poems themselves. Poetry preceded prose, in the form of hymns to the gods, and songs or ballads in celebration of martial deeds. Of the earliest temple poetry no specimens have been preserved, but the Homeric hymns may give us some idea of their style. Of the earliest ballads also, none have come down to us; but the song of Demodocus in the *Odyssey* no doubt very fairly represents their primitive style of composition. The ballads were in their nature epic, and led in the course of time to the proper epic, which is found in its perfect type in the *Iliad* and *Odyssey*. For this great step the world is indebted to the marvellous genius of Homer. The temple poetry appears to have originated in the north of Greece, and in the temples of Dodona, Delphi, and other primeval seats of Greek religious culture. Ballad poetry probably appeared at a very early period on the Greek mainland; but its full development took place among the Ionian colonies of Asia Minor and the *Ægean* islands. The principal names of the legendary minstrels were Amphion, Orpheus, Thamyris, Eumolpus, Musæus, Linus, Olen, and Olympus. The great name of Homer overpeers all other epic poets. We reject entirely the theories of Wolf and Lachmann, and hold to the belief in Homer and in the essential unity of the two great poems. These epics belong, as we have said, to the Greeks of Asia, where Homer was probably born, and where he certainly lived. The *Iliad* is founded on the legends of the war of Troy; the *Odyssey* on the return of Odysseus (Ulysses); and we have them substantially as they came from the genius of their author. About 50 compositions of various length, in a style closely resembling that of the *Iliad* and *Odyssey*, together with a burlesque poem, called *Batrachomyomachia*, or the "Battle of the Frogs and Mice," have also been attributed to Homer. The former probably belong to a period not much later than the Homeric age; the latter certainly belongs to a period several centuries afterward. The epic style was continued by a series of poets called the "cyclic," of whose works only the titles, brief abstracts, and fragments have been preserved. The next development of poetry was in *Boeotia*, in the works of Hesiod, who also employed the epic style. His principal poems are the "Works and Days," and the *Theogonia*. The next form of Greek poetry was the elegiac, and, in close connection with it, the iambic. The rhythm of epic poetry was dactylic, and the metre hexameter. The Ionians of Asia Minor were also the originators of the elegiac and iambic. The elegiac rhythm was also dactylic, and its measure alternately hexameter and pentameter; or rather, every alternate verse consisted of two catalectic trimeters. The principal poets in this style were Archilochus, 720 B. C.; Callinus, 700 B. C.; Simonides of Amorgos, 698 B. C., who shares with Archilochus the credit of having invented the iambic tri-

meter; Tyrteus, 680 B. C., author of the martial elegies; Mimnermus, 600 B. C.; Solon, 630 B. C. This species of composition is sometimes ranked with the lyric; but it is more properly to be considered as a transition from the epic to the proper lyric. The principal orders of lyric poetry were *psalms*, *hyporchemes*, *parœnia*, *scolia*, *embateria*, and *epinicia*. The forms of composition were strophic, *i. e.*, with divisions called strophes, corresponding to each other line for line; choral, with strophes corresponding by pairs, or with these and *proodes*, *mesodes*, and *epodes*. The rhythms were of the richest variety, and artfully constructed so as to express by their movement the sentiment or passion intended to be conveyed by the language. The strophic composition was usually delivered with a simple musical accompaniment; the choral, with a musical accompaniment and a rhythmical motion, sometimes a dance performed by the trained *chorœuta*, or members of the band who delivered it. Of the lyric style, there were two principal schools, the *Æolic* and the *Doric*. The *Æolic* flourished chiefly among the *Æolian* colonies of Asia Minor, and especially in Lesbos. The *Doric* was more generally diffused over Greece, Asia Minor, Sicily, and even Italy. The principal writers of the *Æolian* poetry, which was strophic in form, were Alcæus, 610 B. C., and Sappho, his contemporary, both Lesbians. Akin to this school may be considered the lyric poetry of Anacreon, 560 B. C.; not the odes which pass under his name, but the fragments which alone represent his genuine compositions, and which are rather Ionic than *Æolic* in tone and style. Of the poets who form, as it were, a transition to the proper *Dorian* choral poets, Alcman and Stesichorus may be placed at the head. Stesichorus, 632 B. C., was the first to introduce the epode, and to give a greater variety to the rhythm of the strophes than had been customary before. His language was the old epic, modified by some *Dorian* forms. Simonides of Ceos flourished 556 B. C.; Ibycus about 540; Bacchylides was the nephew of Simonides. We come now to the greatest master of the *Dorian* lyric style, and perhaps the greatest lyric poet of all ages, Pindar, born at Cynoscephalæ in *Boeotia*. Of his numerous compositions, we have only the 4 series of *epinician* odes, *i. e.*, odes written in commemoration of victories gained at the 4 national festivals, the Olympic, Pythian, Nemean, and Isthmian. These are the most important specimens that have come down to us from the lyrical age. We say the lyrical age, because lyrical composition was the characteristic style during this period, although it continued to be cultivated with other species in the subsequent times. The date of Pindar's birth is 522 B. C.—The earliest writers of prose were those who first engaged in philosophical speculations. Of their writings, however, only a few fragments have been preserved. Thales was the founder of the Ionic philosophy, to which belonged Pherecydes, Anaximander, Anaximenes, Anaxagoras, &c. Pythagoras es-



tablished the Italian school, and was followed by Alcæon, Timæus, Epicharmus, Theages, Archytas, and others. In history the Ionians took the lead. Cadmus of Miletus, about 540 B. C., is the earliest; Acesilaus of Argos soon followed. Hecætus of Miletus came somewhat later; Pherecydes of Leros, Oharon of Lamp-sacus, Hellanicus of Mitylene, Dionysius of Miletus, all preceded Herodotus, but were rather chroniclers than historians in the proper sense of the word. The first great historian was Herodotus of Halicarnassus, 484 B. C., who, though a Dorian by birth, wrote in the Ionic dialect. His delightful work is preserved, and its extraordinary merits have given him justly the name of the "Father of History." Literature was cultivated later in Athens than in the Asiatic colonies; but the foundations were more deeply laid, and that famous city must always be regarded as the teacher of the world in arts and letters. We have already mentioned Solon among the elegiac poets. The Athenians were of Ionian descent, and their literature may be regarded as the continuation and perfection of the literature of that race. But the characteristic form of Athenian poetry was the dramatic. During the long period of democratic Athens, especially in the time of Pisistratus, much was done for the patronage of literature and literary men. The Homeric poems were carefully revised, and the regular reading of them was one of the public entertainments of the Panathenaic festival. Dramatic poetry, in a partially developed form, had already existed elsewhere; the dithyrambic tragedy had made its appearance. The dramatic element in the Homeric epics, especially the *Iliad*, could not fail to strike the listeners at the festivals, and to suggest the idea of representing instead of narrating events; of exhibiting persons in action rather than describing them. The dramatic pageantry of the Dionysiac worship furnished another suggestion of the dramatic form. The actual starting point of the Greek drama was the choral song, tragedy springing from the dithyramb and comedy from the phallic representation. But the direction given to the new style was determined by the several influences we have mentioned. Thespis took the first step, 536 B. C., by adding action to the chorus. He was followed by Phrynichus, who flourished 511 B. C., and who was the first to bring female characters upon the stage. His "Capture of Miletus" was performed 498 B. C. Chærilus was his contemporary and rival. Pratinas of Phlius lived in the same period. Æschylus, the perfecter of tragic art, was born at Eleusis, 525 B. C. This great poet added a second actor, and lived to see the tragic art raised to its highest point of excellence by his own genius and that of Sophocles, who added a third. Greek tragedy is well represented by the remaining works of Æschylus, Sophocles, 495 B. C., and Euripides, 480 B. C. Of each of the two former only 7 plays are in existence; of the last there are 19, viz.: 17 tragedies, one

tragi-comedy, and one satyric drama. It was the practice of the tragic writers to combine in one representation 3 tragedies, and a kind of farce, called a satyric drama, because the chorus consisted of satyrs. But instead of a satyric drama, the *Alcestis* of Euripides shows that sometimes the representation was closed by a piece resembling the modern tragi-comedy. The 8 tragedies were called a trilogy, and the 4 pieces together a tetralogy. Of the tragic poets who succeeded the 3 great masters, or were their contemporaries, only the titles of plays and brief fragments remain. Comedy went along with tragedy, and sustained very peculiar relations to it. It originated probably among the Dorians, and was brought into regular form by Epicharmus about 500 B. C., and he is therefore justly called the inventor of comedy. Of the proper Attic comedy Chionides and Magnes were among the earliest writers; but of their works only a few titles remain. Cratinus first exhibited in 448 B. C.; 88 titles of his comedies have been collected. Crates wrote about 450 B. C., and Phrynichus the comic poet lived a little before the Peloponnesian war; the names of 10 of his comedies are extant. Eupolis exhibited for the first time in 429 B. C.; he was a contemporary and rival of Aristophanes. The dates of the birth and death of Aristophanes are unknown—probably, however, about 460 and 380 B. C.; but 11 comedies have come down to us from the 54 which, according to Suidas, he wrote. His first recorded exhibition was 427 and his last 388 B. C. From these plays, 10 of which belong to the old comedy, i. e., to that period of Attic comedy in which public and private characters were introduced by name, we can form a distinct idea of the character and tendencies of this branch of the Attic drama. There were many other writers of the old comedy, but only their names and a few fragments have been preserved. The middle comedy is that form which comedy assumed when it was forbidden by law to introduce living persons by name. Thirty-four poets belonging to this branch are mentioned, but none of their works—of which an immense number were known to the ancients—have been preserved, except in unimportant fragments. The names of 3 sons of Aristophanes occur in this number. The new comedy was a still further modification which comedy first assumed in the age of Alexander. Its distinguishing characteristic was, that all its characters were fictitious. The earliest writer was Philippides, who flourished 328 B. C. The two most celebrated names were Philemon and Menander, the former of whom wrote 97, and the latter 105 plays. Numerous fragments of Menander, some of them of considerable length, show the elegance of his style and the variety and vigor of his genius. The last poet of the new comedy was Posidippus, who began to exhibit in 289 B. C.; he wrote more than 50 pieces. The fertility and excellence of the Greek dramatic literature were most remarkable. The Dionysiac festivals,

celebrated at Athens in the spring, were the principal occasion on which new pieces were brought out, and always in competition for the prize, and under the direction of the chief magistrates. The emulation thus excited among men of the highest genius gave a wonderful impulse to this species of composition, the originality and extent of which have always appeared so surprising.—The prose compositions that belong to this age were equally distinguished by their appropriate excellences. In history, we have Thucydides, born about 471 B.C., whose work on the Peloponnesian war is not only the first specimen of what has been called philosophical history, but remains unsurpassed down to the present time. Xenophon was born in 447 B.C. His historical works, though not equal to that of Thucydides in vigor of coloring and depth of reflection, yet are adorned with every grace of narrative and description. His other works are valuable for the light they throw on the spirit of Greek institutions, and the peculiarities of Greek life. Of the works of Ctesias, Philistus, Theopompus, and Ephorus, which belong to a period somewhat earlier, none have come down entire. In philosophy, to which the teachings of Socrates (born 468 B.C.) gave a great impulse, we have the writings of Plato (born 428 B.C.), and his pupil Aristotle (born 384 B.C.). Plato was endowed with a brilliant imagination, and loved to soar into the highest region of speculation. His sense of the beautiful was exquisite; and his style was at once idiomatic and lofty, while in passages it moved with a rich and stately music which all ages have admired. Aristotle was a student and observer; practical results were the object of his investigations. His style was terse, logical, close, seldom adorned with poetical embellishments, and never with rhetorical exaggerations. Every thing he wrote embodied the results of careful and extensive observations, or comparison of observations. He never entered the world of ideas with Plato. His views were comprehensive, and his exposition, except where the writing evidently contains only the heads of his discourses, are singularly clear. His works embrace the subjects of logic, rhetoric, physics, metaphysics, natural history, and politics. Plato founded the Academic school, whose point of reunion was the academy, on the Cephissus, north of Athens; Aristotle established the Peripatetic school, in the lyceum, near the Ilissus, on the opposite side of the city.—In the same period, political eloquence, always a characteristic form of Greek utterance, reached its highest perfection. In Homer we find not merely traces of eloquence, but admirable specimens. Public discussion was the general rule in the Greek republics. In Athens especially the statesman could not maintain himself, or exercise the smallest influence, without the faculty of public speaking. The historians relate the speeches of statesmen and generals. Thucydides describes the debates at Athens and elsewhere, on the questions that

preceded and the events that occurred in the Peloponnesian war. Herodotus and Xenophon abound in speeches and orations; Solon, Pisistratus, Miltiades, Aristides, Themistocles, and Pericles were orators as well as legislators, counsellors, and generals. Pericles was the first to cultivate the art, and to adorn his mind with the teachings of philosophy and general literary culture. We have no exact report of any of the speeches of this class of statesmen, though Thucydides undoubtedly gives us the substance of several of the most important of those of Pericles. The rhetorical art in its technical character originated in Sicily; and the first rhetorical school at Athens was opened by Gorgias of Leontini. Other sophists and teachers of rhetoric were Protagoras, Prodicus, Hippias, &c. The peculiar judicial system also of Athens made a great demand for the rhetorical talent. The Athenian orators, whose works are extant in whole or in part, are Antiphon, born 480 B.C.; Andocides, 467; Lysias, 458; Isocrates, 436; Isæus, between the conclusion of the Peloponnesian war and the accession of Philip of Macedon; Lycurgus, 408; Hyperides, 396; Æschines, 389; Demades, about the same age as Demosthenes; Demosthenes, 385, or according to others, 381; and Dinarchus, 360. Among the orations of these men there is every variety of excellence, from the subtlest legal argument to the most passionate appeals. Demosthenes combines all the excellences of all the others, with some that are peculiar, at least in degree, to himself.—After the death of Alexander the Great, although literature continued to be cultivated in Greece, and especially in Athens, the rhetorical and philosophical schools holding an eminent position for centuries afterward, yet till the Roman conquest the principal seat of letters and science was Alexandria, under the Ptolemies in Egypt. This period is called the Alexandrian age. Its characteristics were erudition, criticism, and the study of science; and in poetry the only original species was the bucolic or the idyl. The principal poets were Bion of Smyrna, Theocritus, Aratus (epic), Lycophron (author of "Cassandra"), Callimachus (epic, hymns), and Moschus, who flourished at the close of this period. The bucolic poets are picturesque and pleasing. During the Roman supremacy, and down to the introduction of Christianity, the principal poet was Nicander; the most important prose writers were Polybius, Apollodorus, Dionysius Thrax the grammarian, Diodorus Siculus, Dionysius of Halicarnassus, and Dionysius Periegetes. From this period to the close of the Roman empire in the West, are two parallel series of writers, the pagan and the Jewish and Christian. Of the former, the most important are Babrius, Strabo, Epictetus, Plutarch, Dion Chrysostomus, Arrian, Polyænus, Pausanias, Marcus Antoninus, Aristides, Lucian, Pollux, Diogenes Laërtius, Achilles Tatius, Dion Cassius, Athenæus, Herodianus, Philostratus, Plotinus, Dexippus, Longinus, Pausanias, and Iamblichus; of the latter, Jose-

phus, Philo, the authors of the books of the New Testament, Clement of Rome, Justinus, Polycarp, Irenæus, Clemens of Alexandria, and Origen. In literature the Byzantine period is generally considered as beginning with the establishment of the seat of government at Constantinople, A. D. 380, and ending with the capture of Constantinople by the Turks, A. D. 1453. During this long series of centuries, the literature consisted, first, of secular writers, the most important of whom were the succession of authors known as the Byzantine historians; the rhetoricians and grammarians; a few poets, such as Moschus, Quintus of Smyrna, Coluthus, Agathias, and in the 12th century Ptochoprodromus; the romance writers, Longus, Xenophon of Ephesus, Heliodorus; the ecclesiastical and other writers, the principal of whom were Eusebius, Athanasius, Gregory Nazianzen, Epiphanius, Synesius, Socrates, Basilus, Georgius Pisides, Malalas, Georgius Syncellus, Nicephorus, Photius, Constantine Porphyrogenitus, Leo (Philosophus), Theodosius. Of the historians, the best were Zosimus, Procopius (perhaps in point of style the best of the series), Anna Comnena and her husband Bryennius, Chalcocondylas, &c. Of course, in the above series of names, we have selected only a small portion. For a complete list of the writers in the several periods down to the taking of Constantinople, the reader is referred to the work of Prof. E. A. Sophocles, entitled "A Glossary of Later and Byzantine Greek" to be published in the "Memoirs of the American Academy of Arts and Sciences" (vol. vii., Boston and Cambridge, 1860).—After the capture of Constantinople, and the incorporation of Greece into the Turkish empire, literature was by no means neglected. The church was recognized by the sultan, and the patriarch of Constantinople, though holding his office by a precarious tenure, possessed considerable influence. Language and literature were studied in the schools of the Phanari, and in Greece. But intellectual pursuits languished under the tyranny of the Turk. A large proportion of the literature after the fall of Constantinople was ecclesiastical. A living Athenian author, Vretos, has published a list of writers in ancient and modern Greek, between that event and the establishment of the Greek kingdom under Otho. This catalogue contains the names of 201 writers on ecclesiastical subjects, and 222 on all others, including poetry. It is not however complete. For example, we do not find the name of Salomos, the distinguished poet, whose "Ode to Liberty" was one of the most striking appeals inspired by and inspiring the struggle for independence. Comparatively few of these authors possess any general interest; but it is curious and instructive to observe, that under the most depressing circumstances the intellectual activity always characteristic of the Greek race did not cease to make itself felt. We must not omit to except from general censure the admirable prose works of Coray, and the

poems of Rhegas, both of whom exercised an immense influence on their countrymen. Christopulos wrote gay and graceful songs, which have procured for him the designation of the modern Anacreon. He depicts the festive side of Greek life as he saw it at Constantinople, on the shores of the Bosphorus, and on the islands of the Propontia, with simplicity and beauty. During the same period as that above mentioned, the natural tendency of the Greek people to song manifested itself in the production of innumerable popular ballads. Many of these brief epics still exist only on the lips of the peasants of Greece. Collections have been made by Fauriel, Zampelios, and other lovers of the artless poetry of common life. In these simple lays, the joys and sorrows of the people are delineated with force and truth, and frequently with the most exquisite touches of poetry. They embody the feelings of the popular heart which belong to every event—birth, death, separation, departure for other lands; pictures of life among the mountains and valleys, islands and mainlands; love, parental affection, mourning; marriage, feasting, the dying scene. Many of them are martial, and depict the exultation of the combat with the foe, the rapture of victory, the deep-seated desire for revenge; the fortitude which bears tortures without a groan, the courage that defies and encounters without shrinking a countless array of enemies. Among them we are often startled by strange echoes of old Greek poetry, still reverberating among the mountains. Charon, the ferryman of the Styx among the ancients, has become a mysterious minister of death, hanging invisibly over the doomed, or lurking behind a rock or tree, or sweeping like a storm over the mountains, on horseback, with the ghosts of the dead borne at his saddle bow, driven before him, or marching at his side. The birds, whose flight and voice were full of omens to the ancients, are represented in the ballads as endowed with speech and supernatural powers of vision, and often take part in the rapid and vivid dialogues with which they abound. The charm which these terse and racy epics possess for every reader of taste, becomes indescribable when they are heard in the open air, on the mountains and beneath the sky of Greece, in the midst of the scenery which inspired the untaught and nameless minstrels who produced them. The dates of most of these poems cannot be determined. Some of them go back nearly or quite to the time of the Turkish conquest, and some were produced in the midst of arms, during the war of the revolution. One on the capture of Constantinople must have been composed about the time of the event it commemorates; "Charon and the Ghosts" may be even earlier than the Turkish period; "Olympus and Kiasvos," and "Demos, or the Dying Chief," come within that period; while another "Demos" by Tricoupes and "Teamados" appeared during the war. It would be difficult to find, in the whole range of ballad literature, 5 ballads

more spirited and truly poetical than these.—Since the establishment of the Greek kingdom, literature has made great progress in Greece. In the department of education the publications have been innumerable. In history, works of distinguished merit have appeared. We may select out of the great mass, the "History of Souli and Parga," and the "Military Memoirs," by Gen. Perrhæbos, who now lives at a very advanced age in Athens, and whose works were quoted with approbation by Niebuhr; the series of histories by Professor Paparrhegopoulos, distinguished by the eloquence of their style and the animation of their narrative; and the very important work, in 4 volumes, on the Greek revolution, by Spiridon Tricoupeas, the able Greek minister at the court of St. James. Works of erudition, such as the *Hellenica* of Rangabes, and the "History of Greek Literature," by Asopios, will sustain a fair comparison with similar works in other European countries. Asopios has lately published a discourse on Alexander the Great, in which he controverts with learning and ability the view of the Macedonian conqueror taken by Mr. Grote. In cultivated poetry, we may mention the works of Rizos, of Alexander and Panagiotis Soutsos, the younger Rangabes, Zampelios, Zalamastas, Orphanides, Bernadakes, and numerous others. We have already mentioned Salomos the Ionian. Within the last 2 years a young poet, Aristoteles Valaorites, has appeared in the Ionian islands, a worthy successor of Salomos, whose genius bids fair to take a distinguished rank among the poets of this age. The lectures and occasional discourses of the professors in the university, among whom we may mention Asopios, Pericles Argyropoulos, Philippoas, and Kontogones, have great merit in point of style and learning. The orations of Tricoupeas belong to an earlier period. His funeral discourse on Lord Byron is marked by true feeling and pathetic eloquence.—See "History of Classical Literature," by R. W. Browne (2 vols. 8vo., London, 1851; 1 vol. 8vo., Philadelphia, 1852); "A Critical History of the Language and Literature of Ancient Greece," by William Mure (3 vols. 8vo., London, 1850-'57; not complete); "History of the Literature of Ancient Greece," by K. O. Müller, continued by J. W. Donaldson (3 vols. 8vo., London, 1858).

GREEK CHURCH, also called the Greek Catholic, the Orthodox Greek, the Orthodox, or the Eastern church, that part of the Christian church which adheres only to the doctrinal decrees of the first 7 œcumenical councils (of Nice, 325; Constantinople, 381; Ephesus, 431; Chalcedon, 451; Constantinople, 553 and 680; Nice, 787), of the so-called Quinisextum of Constantinople, held in 692, and of the council held at Constantinople under Photius in 879 and 880, while it rejects the authority of all the succeeding councils recognized by the Roman Catholic church as œcumenical. A dogmatical difference between the Greek church and the church of Rome arose as early as 482, when the

emperor Zeno endeavored to reconcile the Monophysites with the Catholic church by publishing a creed called the *Henoticon*, in which the disputed articles were entirely avoided. Felix II., the bishop of Rome, excommunicated the patriarchs of Constantinople and Alexandria for having been instrumental in issuing the *Henoticon*, and thus actually severed the communion between the churches of the East and of the West. The altered dispositions of the court of Constantinople enabled Pope Hormisdas in 519 to restore the union, which, however, never became very firm again, and was repeatedly interrupted by decisions of the emperors in matters of faith, against which the bishops of Rome protested. The adoption in the western church of an article which declared that the Holy Spirit proceeded from the Son as well as the Father (*Filioque*), and its incorporation in the confession of faith at the synod of Toledo (589), constituted another point of dogmatic difference, although it did not awaken opposition in the Greek church until some time in the 8th century. Still more than these dogmatical differences, political and hierarchical reasons prepared a dissolution of the union. The patriarchs of Constantinople, to whom the councils of Constantinople (881) and of Chalcedon (451) had assigned the second place among the patriarchs of the Catholic church, strove to obtain the first. The emperors claimed in the settlement of the numerous dogmatical controversies of the East a power which the bishops of Rome denied to them. The more Rome and Italy became politically estranged from the East, the more intolerable became the exercise of the supreme authority on the part of the bishop of Rome. A temporary dissolution of the union again took place in 782, when the bishop of Rome condemned iconoclasm, which was approved of by several emperors, and by a synod of Constantinople in 754. More serious than ever before became the conflict between the two churches when the patriarch Photius, who through the influence of the court had been elevated to the patriarchal office in 858, was rejected by Pope Nicholas I. as an intruder. A circular was then sent forth by Photius, censuring the observance of Saturday as a fast, the use of eggs and cheese during the first week in Lent, the administration of confirmation exclusively by bishops, the prohibition of the marriage of priests, and the use of the words *Filioque* in the Nicene creed. At a synod convened by Photius at Constantinople in 867 the pope was excommunicated and deposed. Beside these errors, the Roman church was charged with having drawn the Bulgarians into ecclesiastical connection with Rome, though they had been converted by Greeks. Since Photius the relations of the eastern church to that of Rome have never been reestablished in a definite form, though the great schism was not fully declared before July 16, 1054, when Roman legates deposited on the great altar of the church of St. Sophia at Constantinople the sentence of excommunica-

tion, which had been issued against the patriarch Cæsararius, who in 1053 had added to the former charges of heresy brought against the Roman church that of using unleavened bread in the eucharist. At the synod of Lyons (1274) Michael Palæologus allowed his representatives to subscribe to the Roman confession of faith, as he hoped thus to obtain aid against the Turks from the West; but when Pope Martin IV. excommunicated the emperor (1281), Greek synods held at Constantinople in 1288 and 1285 reestablished the independence of the Greek church. For the last time a union between the two churches was consummated at the synod of Florence (1439), by the Greek emperor and the patriarch himself. But the people and the greater part of the clergy were entirely strangers to any such union, and the conquest of Constantinople (1453) made the hostility of the Greek church to Rome still greater. The Roman Catholic church never ceased in its endeavors either to bring about a corporate union, or to gain over individual Greek congregations. Numerous Latin convents were established in the East, and in Calabria the Orosinian seminary was founded by Clement XII. for this special purpose. They succeeded in organizing a Greek United church, which acknowledged the supreme authority of the pope, while on the other hand it was permitted to abide by all the peculiar usages of the Greek church which did not affect fundamental doctrines, as marriage of the priests, reception of the Lord's supper in both kinds, use of the Greek language in the divine service, &c. In Russia, however, almost all the members of the United Greek church were induced, under the reigns of Catharine II. and of Nicholas, again to dissolve their connection with Rome, and to pass over to the Russian church. It is, however, generally believed that a portion of the clergy and of the people were decidedly opposed to this step. Some congregations petitioned the emperor Alexander II. in 1858 for permission to return to the United Greek church, but the union was not permanent. The bulk of the Greek church remained as hostile to a union with Rome as ever, and numerous controversies, such as that under the patriarch Dosithens in Jerusalem on the holy sepulchre (1674), as well as the yearly repeated excommunication of the pope and of his adherents, kept up this spirit of hostility. When, therefore, Pius IX. in 1848 again invited by an encyclical letter the entire eastern church to a corporate union with Rome, his proposition was rejected with scorn. There seems to be in the Greek church not even any organized party, as in most of the other eastern and some of the Protestant churches, which hopes and labors for a future union with the Roman Catholic church. The latter, however, has gained in late years some converts in the highest ranks of the Russian aristocracy (Prince Gallitzin, Prince Gagarin, Count Shuvaloff, &c.), and has established several associations, as the society of St. Dionysius the Areopagite in Turkey, and the so-

ciety of St. Peter in Germany, for the sole purpose of laboring for a reunion of the Greek with the Roman Catholic church. The Protestants early sought to establish friendly relations with the Greek church. Melancthon in 1559 sent a Greek translation of the "Confession of Augsburg" to the patriarch of Constantinople, and in 1574 an epistolary correspondence on this confession took place between the theologians of Tübingen and the patriarch Jeremiah II., yet without success. Cyril Lukaris, who in the 17th century leaned toward Calvinism, was strangled in 1638. In modern times the Greek church has shown itself, in general, very hostile to the Protestant missionary schools and to the Bible societies, though its literature shows a strong influence of Protestantism; a periodical, sympathizing with the principles of Protestant Christianity, was established at Athens in 1858, and found a large patronage. The high church party in the church of England, which recognizes the Greek church as an orthodox branch of the church of Christ, sought to obtain from the Greek bishops the same recognition for itself, and the establishment of a closer intercourse, but has as yet not been successful.—The internal history of the Greek church since its separation from the Roman Catholic is almost entirely destitute of great events. In 1588 Russia received an independent patriarchate, whereby the spiritual supremacy which the patriarch of Constantinople had virtually exercised over the church was abolished. In 1683 a synod of 86 Greek metropolitans, held at Nauplia, declared the orthodox eastern church of Greece independent of every foreign authority; and in 1850 this independence was recognized by Constantinople. Dogmatic controversies rarely occurred, and a formation of new sects took place only in Russia, called forth not so much by doctrinal differences as by opposition to liturgical and hierarchical changes in the state church. With regard to other Christian denominations, as well as to Mohammedanism, paganism, and Judaism, the Greek church has kept itself almost exclusively on the defensive. In Russia, however, the government has succeeded in converting a large number of its non-Christian population, especially in Siberia, to the Greek church, and in Turkey about 7,000 members of the Koorumloo, in March, 1859, sought and obtained permission to return to the Greek church, to which their ancestors, only apparently Mohammedans, had secretly belonged for 4 centuries. The theological literature of the Greek church is not extensive; none of its works have ever been of marked influence on Roman Catholic or Protestant theology. During the present century, however, the number of ecclesiastical seminaries has considerably increased, and the periodical literature is also multiplying.—The Greek church recognizes the Bible and tradition as rules of faith; the latter, however, only so far as it is in accordance with the first oecumenical councils and the synods held at Constantinople

in 692 and 879-880. A system of the doctrines of the Greek church, more complete, and, on account of its application of Aristotelian formulae, more scientific than any similar work in the Latin church up to that time, was compiled by the monk John Damascenus (died 754). The most important confessions of faith are: *Orthodoxos 'Omologia της Πιστεως της Καθολικης και Αποστολικης εκκλησιας της Ανατολικης*, or *Confessio Orthodoxa*, by Petrus Mogilas, metropolitan of Kiev (also called the Russian catechism), published in 1640; and *Λογισ Orthodoxyas*, or *Synodus Hierosolymitana*, under Dositheus, in 1672. The former, which in 1643 was signed by all the Greek patriarchs, and solemnly recognized at the synod of Jerusalem in 1672 as the confession of faith of the oriental church (published in Greek and Latin, Amsterdam, 1663; Leipzig, 1695; in German by L. Frisch, Frankfurt, 1727), has everywhere, especially in Russia, symbolic authority. The latter was signed by 67 bishops and clergymen. None of the other books, sometimes regarded as symbolical (e. g., the two confessions of the patriarch Gennadios in Constantinople, the confession of the patriarch Jeremiah of 1580) has obtained so general a symbolic authority, and the confession of Metrophanes Kriptulos of 1661 is only a private letter. (See Kimmel, *Libri Symbolici Ecclesiae Orientalis*, Jena, 1848, and appendix to this work by Weissenborn, 1850.) Plato, a Russian archbishop and president of the academy of St. Petersburg, was the author of a catechism which in many points differs from that of Petrus Mogilas, and is less hostile to Protestantism. The Greek church holds in common with the Roman Catholic the doctrines of 7 sacraments, of the sacrifice of the mass, of the veneration of the Virgin Mary, the saints, images, and relics, of the meritoriousness of fasting and other works, the hierarchical degrees of ecclesiastical orders, and monasticism. Its peculiar tenets are mainly the following: It disowns the authority of the pope, and lays no claim to the character of infallibility. It performs baptism by trine immersion. It administers the Lord's supper in both kinds, and gives the sacraments of confirmation and communion to children immediately after baptism. It denies the existence of a purgatory, yet prays for the dead, that God would have mercy on them at the general judgment. It maintains that the Holy Ghost proceeds only from the Father, and not from the Son. It admits of no images in relief or embossed work, but uses paintings and engravings in copper or silver. It approves of the marriage of priests, provided they enter into that state before their admission into holy orders; it condemns second marriages of priests, and fourth marriages of laymen. It keeps 4 fasts in the year more solemnly than the rest.—The churches are mostly built in the form of a cross. The altar stands toward the east under a vault which is higher than the nave, and separated from it by a partition board containing 3 doors, the middle of which is called the sacred door, and when opened permits

the altar to be seen. At the beginning of the canon of the mass the doors are closed, and are not opened again until after the communion of the priest and deacon. Benches are not used, as the people during divine service do not sit, but stand, for which purpose they use a kind of crutch as a support. The principal act of divine worship is the mass, which every member of the church is bound to hear every Sunday. Only one mass a day is said in each congregation, and that before the rising of the sun. The liturgy used at the mass is ascribed to the apostle James, and Basil the Great is said to have been the first to compile, in an abridged form, the oral traditions. His work was again abridged by Chrysostom, and in this shorter form, which however has likewise undergone some changes in the course of time, it is used on common days, while the longer liturgy of Basil is still used at some of the higher festivals. The sermon, which is considered unessential, was formerly very rare, and consisted generally of a homily read from old collections. The priests of Russia began in 1682 to preach their sermons instead of reading them from books, and gradually it became the general practice to preach at least twice a year. In 1858 many of the churches of St. Petersburg introduced the custom of having a sermon every Sunday. All the sermons, however, had to be submitted to the previous examination of the bishops, which censorship was abolished in the diocese of St. Petersburg at the beginning of 1859. Festivals peculiar to the oriental church are the consecration of water on Jan. 6 in commemoration of Christ's baptism, and the Orthodox Sunday, on which a curse is pronounced against all heretics. It is forbidden to use instrumental music in the churches, but the mass is generally accompanied by choirs of singers. Catechising is something rare, and the arrangements for religious instruction are very imperfect. The language used at divine service is among the Greeks of Turkey and Greece the old Greek, among the Russians and other Slavic nations the old Slavonic, and among the Georgians the old Georgian.—The clergy are divided into two classes, the higher and the lower clergy. The former class comprises the patriarchs, metropolitans, archbishops, and bishops; all of whom are chosen from among the monks, and must live in celibacy. The lower clergy are subdivided into the black clergy (so called after their dress) or monks, and the white or secular clergy, who wear blue, violet, or brown dresses. A convent is governed by an abbot (*αρχιμανδριτης*); and among the other monks there are priors (*ηγουμενοι*), priests (*ιερομοναχοι*), and deacons (*ιεροδιακονοι*), who can perform the same functions as the priests and deacons of the secular clergy. All the others are merely called monks (*μοναχοι*). The lower secular clergy are protopopes (*πρωτοιεροι*, arch priests), popes (priests), deacons, hypodeacons, and lectors. The monks of the Greek church, as well as the nuns, who are less numerous, generally follow the rule

of St. Basil, with the exception of those of Mt. Sinai and Mt. Lebanon, who follow the rule of St. Anthony. At the head of the female convents stands an *oikonomos*, who must be at least 80 years of age. He chooses a priest as confessor of the nuns, who also elect, under his presidency, an abbeys (*hypomev*). The most celebrated convents are those of Mt. Athos, the convent of the holy sepulchre in Jerusalem, and that of Mt. Sinai in Arabia.—With regard to church constitution, the Greek church is made up of 10 independent groups, counting altogether 279 bishoprics. I. The church of Constantinople is governed by a patriarch, who bears the title of "Most Holy Archbishop of Constantinople, New Rome, Œcumenical Patriarch." He has under him 136 bishops, of whom there are 11 in the 8 Danubian principalities (4 in Wallachia, 3 in Moldavia, 4 in Servia), 7 in the Ionian isles, and one at Venice. The churches of Wallachia, Moldavia, and Servia incline to make themselves independent of Constantinople; and in Bulgaria and Bosnia the Slavic population is making the most energetic efforts to get rid of the Constantinopolitan clergy. These efforts, if successful, will increase the number of independent groups of the Greek church to 15. The population of the Ionian isles, being of Greek race, does not tend to the same kind of independence as the Slavic and Roumanic race; but it ardently desires the incorporation of the republic of the Seven Islands with the kingdom of Greece, and if this event were to happen, doubtless the 7 bishops would recognize the authority of the synod of Athens in preference to that of the patriarch of Constantinople. Throughout the immediate possessions of the Sublime Porte (i. e., all European and Asiatic Turkey except Wallachia, Bosnia, and Servia) the patriarch of Constantinople has not only spiritual, but also a kind of temporal jurisdiction, as he is considered by the Turkish law the head of all the Greek Christians, who have to pay to him a yearly tax. He presides in the synod, the highest ecclesiastical board, which governs the Greek church of Turkey, and consists of all the patriarchs, and a certain number of archbishops (properly 12), who have to take up their permanent residence at Constantinople. In certain cases, as the election of a patriarch, the holy synod has to act in union with the national assembly, a number of representatives of the most distinguished Greek families of Constantinople. The *Hatti-Humayoun* of Feb. 21, 1856, announced important changes in the relation of the patriarchs and the holy synod to the Greek church. They were to receive a fixed salary, to lose their temporal and judicial power, and the patriarchs and bishops were to be appointed for life. A supreme church council, to consist of priests and laymen, was to be elected by the entire church. The opposition of the higher Greek clergy has however up to the present time (1859) baffled these projects. II. The church of Alexandria counts 5 bishops, under the "Blessed and Holy Patriarch of the great

city of Alexandria, of all Egypt and Pentapolis, of Libya and Ethiopia, Pope and Judge Œcumenical." The patriarch habitually resides at Cairo. III. The church of Antioch numbers 17 bishops. Its chief bears the title of "Blessed and Holy Patriarch of the City of God, Antioch, Syria, Arabia, Cilicia, Iberia, Mesopotamia, and all the East, Father of Fathers and Pastor of Pastors." IV. The church of Jerusalem has 14 bishops. The patriarch is called the "Blessed and Holy Patriarch of the Holy City of Jerusalem, of Palestine, Syria, Arabia beyond Jordan, Cana, Galilee, and Holy Sion." V. The Russian church has 60 bishops, governed by the "Most Holy Synod directing all the Russias," which was first established by Peter the Great, and consists of 8 metropolitans, one archbishop, 2 other clerical and 2 lay members. VI. The church of the isle of Cyprus counts 4 bishops, under the "Blessed and Holy Bishop of New Justiniana and of all the Isle of Cyprus." His see is at Nicosia. VII. The Greek church in Austria has 11 bishops, who acknowledge the supremacy of the "Blessed and Holy Archbishop of Carlowitz, Metropolitan." During the troubles of 1848 the prelate assumed the title of patriarch, which he has kept ever since. VIII. The church of Mt. Sinai has only one bishop, the "Blessed Archbishop of Sinai." IX. The church of Montenegro likewise has but one bishop, called "Metropolitan of Scanderia and the Sea-shore, Archbishop of Cetigne, Exarch of the Holy See of Ipek, Lord of Montenegro and of Berda." He had formerly both spiritual and temporal power, but recently the jurisdictions have been divided. The present bishop was induced by the Russian government to go to St. Petersburg, and not, as was done by his predecessors, to Constantinople, to receive episcopal consecration. X. The Hellenic church, in the kingdom of Greece, numbers 24 archbishops and bishops, governed by the "Holy Hellenic Synod" of Athens. The presidency of this board belongs by right to the metropolitan archbishop of Attica and Boeotia, residing in Athens. The other 4 prelates change every year. This board was established in 1852, and consists of 5 prelates of the kingdom. They meet annually in September, and have to take an oath of fidelity to the king before beginning their proceedings. All these 10 divisions of the orthodox church recognize the supreme authority of a general council; but as no general council has been assembled for 1,000 years, they do not agree on the conditions required to make a council really Œcumenical. In addition to these 10 divisions of the Greek church which recognize each other as orthodox, there are in Russia a number of sects, which fully acknowledge the doctrinal basis of the Greek church, but reject the liturgy of the Russian church as corrected by Patriarch Nikon (1654), and therefore keep aloof from any intercourse with the state church. By the state church they are called *Raskolniki* (separatists), while they call themselves *Staroveretsi* (of the old faith). The

number of these sects dissenting from the state is large. They also widely differ from each other, and some of them have placed themselves in open opposition not only to the liturgy and the government of the Russian church, but also to the doctrines of the Greek church in general. As from their origin they have been incessantly subjected to persecution, their peculiarities are but imperfectly known. The great argument employed against those of them who adhered to the orthodox doctrine of the Greek church was, that the true church is essentially episcopal; therefore they, having no bishop, could not be the true church. Very recently, however, the Greek bishops of the Austrian empire have obtained for them a bishop. The former rigor of the Russian government against them has been mitigated since the accession of Alexander II., and in 1859 an imperial decree even prescribed that the bishops of the state church shall in future ordain the priests and bishops of the Raskolniki.—The Greek church predominates in all Russia, European Turkey, Greece, the Ionian isles, and Montenegro, and its area is continually extending by the progress of Russia in central Asia. The number of Greek Christians in Russia amounts to about 49,000,000. This however includes the sects, whose number was estimated in 1880 at 5,000,000, while according to other statements it is much greater, and amounts to 12,000,000 or 15,000,000. All the non-Russian accounts agree that their number is constantly increasing. Turkey numbers about 12,000,000 inhabitants belonging to the Greek church; Austria (according to the census of 1851), 3,505,668; the kingdom of Greece, about 900,000; Montenegro, 125,000; the Ionian isles, 180,000; Prussia, about 8,000. In all other countries only a few Greek churches are found, nearly all of which are connected with Russian embassies. Thus the whole population connected with the Greek church will hardly reach 66,000,000. The calculation of Dr. Dieterici (in Petermann's *Mittheilungen*, 1859) estimates the total number at 76,000,000. This excess of 10,000,000 is caused by two mistakes: first by counting, under Russia, the whole population belonging to other churches as only 9,510,826, while the Russian census gives this as the total of the dissenters, exclusive of Poland and Finland, in which two countries there are only a few thousand Greeks; secondly, by counting in the United Greeks, who in doctrine are Roman Catholics, not Greeks. The greatest number of United Greeks is in Austria (2,751,846); Turkey has about 25,000; Russia, 250,000; the kingdom of the Two Sicilies, 80,000. They were formerly very numerous in Russia, where under the Polish rule a considerable portion of the church acknowledged the supremacy of the pope, at the synod of Brzesc (1596). But most of them returned to the Russian state church under the reign of Catharine II., and the remainder at a synod at Polotsk, in 1839. The total number thus lost by the Roman Catholic church in Russia is estimated at about 10,000,-

000. The Greek United church in Austria has 2 archbishops and 6 bishops; in Turkey, one patriarch (of Antioch) and 8 suffragans; in Russia, one bishop at Chelm.—See Chytræus, *De Statu Ecclesiarum hoc Tempore in Græcia* (Rostock, 1589); Leo Allatius, *Græcia Orthodoxa* (2 vols., Rome, 1652 and 1659); Le Quien, *Oriens Christianus* (8 vols., Paris, 1740); Thomas Smith, *De Ecclesia Græca Statu Hodierno* (London, 1678); Wenger, *Beiträge zur Kenntniss des gegenwärtigen Geistes der Griechischen Kirche* (Berlin, 1839); H. J. Schmitt, *Kritische Geschichte der Neugriechischen Kirche* (Mentz, 1840); Wiggers, *Kirchliche Statistik* (2 vols., Hamburg, 1843); *L'église orthodoxe d'Orient* (Athens, 1858); J. M. Neale, "History of the Holy Eastern Church" (London, 1847 et seq.).

GREEK FIRE. The knowledge possessed of this ancient material of war is gathered by Gibbon in the "Decline and Fall of the Roman Empire," chap. lii. The subject is also ably treated by Dr. McCulloch in vol. xiv. of the "Quarterly Journal of Science." The Greek fire was most advantageously employed in the defence of Constantinople during the two sieges by the Saracens of A. D. 668-675 and 716-718. The secret of its preparation and use was derived from a native of Heliopolis of Syria, or, according to Cedrenus, of Egypt, who deserted to the service of the emperor. It appears to have been a compound of bitumen, sulphur, and pitch, and to have been poured from caldrons, or projected in fire balls, or on arrows and javelins around which flax was twisted saturated with the inflammable compound. It was vomited through long copper tubes from the mouths of hideous figures, which were set in the prows of fire ships. These were themselves consumed, as they sent fire and destruction among the galleys of the enemy. For 400 years its secret was successfully preserved by the Romans of the East, the vengeance of heaven being imprecated upon whomsoever should divulge this composition, which the people were taught to believe was mysteriously revealed by an angel to the first and greatest of the Constantines. The Mohammedans finally obtained the secret, and in the holy wars of Syria and Egypt turned the art against the Christians. Joinville in his *Histoire de St. Louis* describes the fire as coming through the air like a winged long-tailed dragon, about the thickness of a hogshead, with the report of thunder and the velocity of lightning, producing so much light from the quantity of fire it threw out, that one might see in the camp as if it had been day—a description not inapplicable to the rocket. Its use was continued till the middle of the 14th century, when it gave place to the more efficient compound of somewhat similar nature then invented.—The name Greek fire has been applied to compounds that burn on the surface of or under water. An inflammable liquor of this character is said to have been discovered in 1755 by a goldsmith of Paris, named Dupré, who was not, however, permitted to make its



character known. The photographer M. Niepce de St. Victor has experimented, by request of the French minister of war, upon the property of benzole to burn upon water and of igniting it with a bit of potassium or of phosphuret of calcium be contained in it. He found that if a glass vessel containing 800 grammes of benzole and  $\frac{1}{4}$  gramme of potassium were broken on the surface of the water, the benzole would immediately overspread a considerable surface, bursting at the same time into flame. A mixture of 8 parts of benzole and one of sulphuret of carbon, being put into a hand grenade previously heated by immersion in boiling water, produced a disengagement of vapor, which could be ignited and would continue to burn from a jet till the whole was consumed. Phosphorus in solution increases its power of setting fire to other objects. Oil of petroleum may be substituted for the benzole. It was thought that this might be used in naval warfare as the ancient Greek fire was employed. The subject is fully treated by Scoffern in his work "Projectile Weapons of War and Explosive Compounds" (London, 1858), in which he also names several liquid mixtures that spontaneously ignite, and may be used for the same purposes as Greek fire. A solution of phosphorus in sulphuret of carbon thrown in a glass grenade was found, in experiments conducted at Woolwich, to ignite soon after the liquid was scattered. Chloride of sulphur may be substituted for the sulphuret of carbon, the ignition not taking place quite so soon, thus giving time for the liquid to penetrate into wood work and canvas. An abominable odor is diffused during the combustion. The arsenical alcohol, described under KAKODYLE, is proposed for a similar purpose, the fumes from which would greatly add to its deadly effects. (See also "Mechanics' Magazine," Aug. 18, 1844.)

GREELEY, HORACE, an American journalist, founder of the "New York Tribune," born in Amherst, N. H., Feb. 8, 1811. His father, Zacheus Greeley, was a farmer. His childhood was characterized by eagerness as well as aptitude in the acquisition of knowledge, fondness for study rather than play, and a habit of closely scrutinizing whatever phenomena came in his way. He was hardly 10 years old before he had read, chiefly by the light of pine knots, every readable book that he could borrow within 7 miles of his father's house. His delight in books led him, while yet a child, to the determination to be a printer. In 1821 the family removed to Westhaven, Vt., where for 5 years he assisted his father in his labors as a farmer, at the same time eagerly availing himself of every opportunity for reading and study. In the spring of 1826 he entered the office of the "Northern Spectator," at East Poultney, Vt., as an apprentice to the art of printing. He speedily became an expert workman, while he diligently availed himself of the peculiar facilities for intellectual improvement which a printing office ever affords. He became the best workman in the office, and sometimes rendered important assist-

ance in editing the paper. In June, 1830, when he was in his 20th year, his apprenticeship was suddenly terminated by the discontinuance of the "Northern Spectator," and the breaking up of the printing establishment at East Poultney. His knowledge of political statistics, of party movements and their leaders, was so extensive, that, young as he was, he was regarded as an authority in such matters. His parents were now living in Erie co., Penn. After spending a few weeks with them, he worked as a journeyman for a short time in Jamestown and Lodi, N. Y., and subsequently, for a somewhat longer period, at Erie, Penn. In Aug. 1831, he went to New York, with a scanty wardrobe, and only \$10 in his pocket, in quest of employment, which he soon obtained. He worked as a journeyman in several different offices till Jan. 1, 1833, when he commenced the printing business for himself, entering into partnership with Mr. Francis Story. Greeley and Story were the printers of Dr. Sheppard's "Morning Post," the first penny daily paper ever published in the world. The paper failed in less than 3 weeks, and the firm of Greeley and Story, after an existence of only 6 months, was dissolved by the death of the junior partner. Mr. Greeley afterward took for his partners Mr. Jonas Winchester and Mr. E. Sibbett, and the business was continued in the name of Greeley and co. The "New Yorker," a weekly journal of which Mr. Greeley was the editor, was commenced by this firm, March 23, 1834. It was a political, literary, and family newspaper; and in the department of political statistics especially it was regarded by all parties as an authority. Its circulation, for that period, was extensive, but owing to some defect in its business arrangements, it was not profitable to the proprietors, though it was continued for 7 years. The slender income derived from the "New Yorker" obliged Mr. Greeley to engage in other labors. He supplied the "Daily Whig" with its leading articles for some months, and for one year, in 1838-'9, edited the "Jeffersonian," a weekly political journal, published in Albany, and devoted to the interests of the whig party. In 1840 he edited the "Log Cabin," a weekly journal established to promote the election of William Henry Harrison to the presidency, and which obtained a very wide circulation. On April 10, 1841, he commenced the publication of the "Daily Tribune." In the following autumn the "Weekly Tribune" was commenced, the "New Yorker" and the "Log Cabin" being merged therein; and with these journals his name has since been identified. In 1848 he was elected to congress to fill a vacancy, and served in that body from Dec. 1 of that year to March 4, 1849, distinguishing himself chiefly by his opposition to the abuses of the mileage system. As an editor and a lecturer he has labored zealously to promote the welfare of the laboring classes. In 1850 a volume of his lectures and essays was published under the title of "Hints toward Reforms." In 1851 he made a voyage across the Atlantic, and during

his stay in England served as one of the jurymen at the crystal palace exhibition. After his return he published a volume entitled "Glances at Europe." In 1856 he published a "History of the Struggle for Slavery Extension or Restriction in the United States from 1787 to 1856." In 1859 he made a visit to California, travelling thither by way of Kansas, Pike's Peak, and Utah. He was everywhere well received, and in California was welcomed by the municipal authorities and citizens of various places, whom he publicly addressed upon politics, the Pacific railroad, temperance, &c.—See "Life of Horace Greeley," by J. Parton, 12mo., New York, 1855.

GREEN, one of the prismatic colors, produced by combination of blue and yellow rays. In the vegetable kingdom it is in its various shades the most common color. Among minerals it is comparatively rare. Copper and chromium furnish it of various shades in their different salts; and it may be produced in some of the combinations of nickel, &c., and also by the admixture of mineral blues and yellows. The pigment BRUNSWICK GREEN has been described under its own title. Mountain green is the natural or artificial hydrate, oxide, or carbonate of copper. Sap green is a preparation of the juice of buckthorn berries. They are allowed to ferment 8 days, and are then pressed; alum is added to the juice, and this, concentrated by evaporation, is then put into pigs' bladders, where it becomes dry and hard. Scheele's or Mitti's green is obtained by dissolving one part of arsenious acid and 10 of crystals of sulphate of copper in water, and precipitating with an alkaline carbonate; or if with caustic alkali, a more intense shade of green is obtained, and the pigment becomes hard by drying. More arsenic gives a yellowish tinge. The color is used in calico printing, and, though a rank poison, has been detected in French confectionery. Digested in acetic acid, it produces a variety of the next described kind of green. Schweinfurt green, a beautiful color, is prepared by decomposing at boiling temperature an aqueous solution of 6 parts of sulphate of copper by another solution of 6 parts of arsenious acid and one part of crude potash. As soon as the precipitation is completed, about 3 parts of acetic acid is to be added. The precipitate gradually diminishes in volume, and in a few hours changes into a slightly crystalline and beautiful green powder. This is to be carefully washed by decantation. Instead of sulphate of copper, the acetate may be employed. More arsenic increases the yellow tinge, and boiling some time in a mild alkaline solution deepens the shade. It is sometimes known in commerce as Vienna green and Brunswick green.

GREEN, a S. co. of Wis., bordering on Ill., intersected by Pekatonica and Sugar rivers, the latter of which is a valuable mill stream; area, 576 sq. m.; pop. in 1855, 14,727. The surface is much diversified, the S. part consisting of prairies, and the remainder being thinly wooded. The soil is fertile even in the hilly districts, and

the hills are arable to their very summits. The productions in 1850 were 148,997 bushels of wheat, 152,487 of oats, 133,595 of Indian corn, 10,588 tons of hay, and 113,867 lbs. of butter. There were 6 churches, a newspaper office, and 1,132 pupils attending public schools. Limestone is abundant, and lead is mined with some profit. Organized in 1838. Capital, Monroe.

GREEN, ALEXANDER L. P., D.D., a minister of the Methodist Episcopal church South, born in Sevier co., Tenn., June 26, 1807. In his youth he commenced the study of medicine, but being impressed with the conviction that it was his duty to preach, he made but little progress; and in 1824, when he was but 18 years of age, he entered the ministry, and became connected with the Tennessee conference. After 4 years he was ordained elder. At the age of 25 he was elected a delegate to the general conference, and has been elected every subsequent term until the present time. He was particularly prominent in the discussions of 1844 which resulted in a division of the church. Dr. Green has contributed largely to the various departments of literature, and occupies a high rank among the clergy of the South, both as a preacher and writer. His principal literary work is entitled "The Church in the Wilderness," which obtained a wide popularity.

GREEN, ASHBEL, D.D., an American clergyman, born in Hanover, N. J., July 6, 1762, died in Philadelphia, May 19, 1848. His father was the Rev. Jacob Green, a Presbyterian minister, and his mother was a granddaughter of the Rev. John Pierson, first president of Yale college. In early life he mingled somewhat in the scenes of the revolution, and was in imminent peril at the attack on Elizabethtown Point. From his intercourse with certain officers of the army, he became sceptical in regard to the divine authority of the Scriptures; but a more thorough examination of the subject restored him to his early belief. He was admitted to the junior class of the college of New Jersey in 1782, and was graduated with the highest honor in 1788. He was immediately appointed to a tutorship in the college, which he held for two years; then to the professorship of mathematics and natural philosophy, in which he continued for a year and a half. Having studied theology under President Witherspoon, he was licensed to preach by the presbytery of New Brunswick in 1786. Shortly after he accepted a call from the second Presbyterian church in Philadelphia, and was ordained and installed as colleague pastor with the Rev. Dr. Sproat, in May, 1787. The same year he was elected a member of the American philosophical society. In 1790 he was a member of the general assembly, and was chiefly instrumental in bringing about the correspondence which has ever since existed between the Presbyterian and Congregational bodies. In the summer of 1791 he made a tour into New England, chiefly for the benefit of his health, which brought him in contact with many eminent men, whose characters are some-

what minutely portrayed in his autobiography. In 1792 he received the degree of D.D. from the university of Pennsylvania; the same year he was elected chaplain to congress, and was reelected by every successive congress till the removal to Washington in 1800. Dr. Sproat having died in Oct. 1793, the Rev. John N. Abeel was installed as Dr. Green's colleague, but he resigned his charge in 1795, and 4 years after was succeeded by the Rev. Jacob J. Janeway, who remained in charge of the church after Dr. Green's ministry in connection with it had closed. In 1809 he had a primary agency in forming the Philadelphia Bible society—the first society of the kind formed in the United States—and wrote the address on the occasion, which was very widely circulated, and led to important results. He was one of the originators and most efficient friends of the theological seminary at Princeton, not only drafting its constitution, but being president of its board of directors from its organization till his death. In 1812 he accepted the presidency of Princeton college, and about the same time received the degree of LL.D. from the university of North Carolina. In 1823 he resigned the office of president, and returned to Philadelphia, where, during the next 12 years, he edited the "Christian Advocate," a monthly religious periodical. He also preached to an African congregation for 2½ years, and rendered many important services in aid of the general interests of the church. He was the subject of a long and gradual decline, which was marked by the most unqualified submission to the divine will. His remains were removed to Princeton for burial. He published a "Discourse delivered in the College of New Jersey, with a History of the College" (Boston, 1822); a "History of Presbyterian Missions," "Lectures on the Shorter Catechism" (2 vols.); 11 original discourses, beside various addresses, reports, &c. Dr. Green had a clear and comprehensive mind, and was one of the best educated clergymen of his day. He had great natural sternness, qualified, however, by a rich vein of tenderness and benevolence. As a preacher he was luminous, bold, and effective. As the president of a college he was both able and faithful. He sustained all his public relations with great dignity and usefulness. For nearly half a century he was one of the commanding spirits in the Presbyterian church in the United States.

GREEN, HORACE, an American physician, born in Chittenden, Vt., Dec. 24, 1802. He studied medicine in Rutland, Vt., and was graduated at Middlebury in 1824. After 6 years' practice in Rutland, he attended lectures at the university of Pennsylvania in 1830-'31, and subsequently practised 5 years' more in Rutland, after which he settled in New York. His medical education was completed in Paris, which he visited in 1838. Soon after his return to the United States he read before the New York surgical society a paper on the method and value of topical medication for the diseases of the air pas-

sages, a mode of treatment original with him, and now become general. In 1846 he published a "Treatise on the Diseases of the Air Passages" (8vo., New York). His remaining works are: "Pathology and Treatment of the Croup" (12mo., 1849); "Surgical Treatment of the Polypi of the Larynx and the Oedema of the Glottis" (8vo., 1852); "Report of 106 Cases of Pulmonary Diseases treated by Injections into the Bronchial Tubes with a Solution of Nitrate of Silver" (1856); and "Selections from the Favorite Prescriptions of Living American Physicians" (1858). He is also the author of many papers in American and British medical journals. From 1840 to 1843 he was a professor in the medical college in Castleton, Vt., and in 1850 he assisted in founding the New York medical college, in which he is president of the faculty and trustees, and emeritus professor of the theory and practice of medicine. In 1854 he joined his colleagues in the college in establishing the "American Medical Monthly," with the editorial department of which he was for some time connected.

GREEN, JACOB, an American writer on science, born in Philadelphia, July 26, 1790, died there, Feb. 1, 1841. He was graduated at the university of Pennsylvania at the age of 16, and immediately afterward gave proof of his predilection for the study of the natural sciences by publishing in connection with a young friend a treatise on electricity and galvanism. He was subsequently fitted for the bar, but never practised, and in 1818 was appointed professor of chemistry, experimental philosophy, and natural history, in the college of New Jersey. This position he exchanged 4 years later for the chair of chemistry in the Jefferson medical college, Philadelphia, which he filled until his death. He is the author of a number of scientific text books, including "Chemical Philosophy" (8vo., Philadelphia, 1829), "Astronomical Recreations," "Treatise of Electro-Magnetism," "Monograph of the Trilobites of North America," &c.; of papers in the "American Journal of Science;" and of "Notes of a Traveller through England and Europe" (3 vols. 18mo., 1831).

GREEN, JAMES STEPHEN, U. S. senator from Missouri, born in Fauquier co., Va., Feb. 23, 1817. His early opportunities for obtaining instruction were very limited, but by energy and self-culture he acquired a good practical English education. In the autumn of 1837, after having resided a year in Alabama, he removed to Lewis co., Mo., and commenced the study of law, supporting himself by laboring at intervals at such miscellaneous employment as he could find. After struggling with adverse fortune for 8 years, he was admitted to the bar in 1840, and at once entered upon a successful practice. In 1844 he was chosen a presidential elector, and voted for Polk and Dallas. In 1845 he was a member of the convention called to revise the constitution of Missouri. In 1846 he was chosen a representative in congress, took his seat in Dec. 1847, and became a zealous

supporter of President Polk's administration. He was reelected in 1848, but was defeated in 1850 and again in 1852. In 1853 he was appointed by President Pierce chargé d'affaires to New Granada. The climate of Bogota proving prejudicial to his health, he resigned the office in 1854 and returned home. In 1856 he was again elected to the house of representatives, but before taking his seat was chosen a U. S. senator for the term ending in 1861. He entered the senate in Dec. 1857, and bore a conspicuous part in the Lecompton contest of the session of 1857-'8. The majority report of the committee on territories in favor of the admission of Kansas under the Lecompton constitution was presented by him, the minority report in opposition to the Lecompton constitution being submitted by Mr. Douglas. In Dec. 1858, Mr. Green was made chairman of the senate committee on territories.

GREEN, SAMUEL, one of the earliest printers of New England, born in England in 1616, died in Cambridge, Mass., Jan. 1, 1702. He succeeded Day in the printing house at Cambridge about 1648. He printed the "Cambridge Platform" in 1649, the laws in 1660, and, at the expense of about £1,300 paid by the commissioners, the following in the Indian language, viz.: the Psalter, Eliot's Catechism, Baxter's "Call to the Unconverted," the New Testament, and 1,000 copies of the Bible in 1683. He had 19 children, and his descendants were a race of printers, living in Massachusetts, Connecticut, Vermont, and Maryland.

GREEN BAY, a large arm of Lake Michigan, communicating with the W. side of the lake by a broad opening at which lies a group of islands, 80 m. in extent, called Grand Traverse islands. It forms part of the boundary between Wisconsin and the upper peninsula of Michigan, and is 100 m. long from N. E. to S. W., and from 15 to 30 m. broad. It receives Menomonee, Fox, and several smaller rivers. The name Green was given it on account of the color of its waters, caused by its great depth, which is said to exceed 500 feet.

GREEN BAY, a city, capital of Brown co., Wis., on the right bank of Fox or Neenah river, at its mouth, and at the head of Green bay, 114 m. N. from Milwaukee and 120 m. N. E. from Madison; pop. in 1857, about 5,000. It is one of the oldest places in the north-west, having been founded by French settlers in 1745, and formerly known under the name of Navarino. For about 40 years it made little progress, but it is now rapidly becoming a great commercial depot for the interior and N. parts of the state, and has an extensive trade in lumber cut from the neighboring pine forests. It has a secure harbor, visited by the largest steamers from Lake Michigan; a railroad has been commenced, and is partly in running order, which will connect it with Milwaukee; while, by means of the Fox river improvements, it now has uninterrupted steamboat communication with the Mississippi. The town has a beautiful situa-

tion, and contains many handsome warehouses and private dwellings, several churches, hotels, banks, a U. S. land office, and 2 weekly newspaper offices. On the opposite bank of the river is Fort Howard and the village of that name, with several factories.

GREEN GAGE, the name of a luscious, rich-flavored fruit, long known to gardeners as the very best kind of plum. In France it is called the *Reine Claude*, being supposed to have been introduced into that country by Queen Claude, wife of Francis I. It bears numerous other synonymes, according to the localities where it has been cultivated. Several seedlings have been produced from it, but none equal to the original parent. The variety known about New York as the Bruyn gage is the true Reine Claude, brought from France by Chancellor Livingston. The tree is slow growing, of a dwarfish, spreading habit, and an abundant and pretty regular bearer. The fruit ripens about the middle of August.

GREEN MOUNTAINS, the northern portion of the Appalachian chain, extending from Canada S. through Vermont. To this state, over which they are largely spread, they give its name, from the term *monts verts* by which they were known to the early French settlers. The continuation of the range through Massachusetts and Connecticut is also known to geographers as the Green mountains, but by the inhabitants of these states other names are applied to them; as the Hoosic mountains in Massachusetts for that portion lying near the Connecticut river, and constituting the most elevated portion of the state between this river and the Housatonic, and the Taconic mountains for the western part of the range which lies along the New York line. These ranges extend into Vermont near the S. W. corner of the state, and join in a continuous line of hills, that pass through the western portion of the state nearly to Montpelier. Without attaining very great elevation, these hills form an unbroken water-shed between the affluents of the Connecticut on the E. and the Hudson and Lake Champlain on the W., and about equidistant between them. S. from Montpelier two ranges extend, one toward the N. E. nearly parallel with the Connecticut river, dividing the waters flowing E. from those flowing W.; and the other, which is the higher and more broken, extending nearly N. and near Lake Champlain. Through this range the Onion, Lamoille, and Missisquoi rivers make their way toward the lake. Among the principal peaks are Mt. Mansfield, 20 m. N. W. from Montpelier, and 4,859 feet above the level of the sea; Camel's Hump, 17 m. W. from Montpelier, 4,188 feet high; Killington's, near Rutland, 3,675 feet high; and Ascutney, in Windsor co., near the Connecticut river, 3,320 feet.—This portion of the Appalachian chain neither possesses in so marked a degree the features of uniformity of elevation and parallelism of its ridges that characterize the same chain further S., nor has it the abruptness and precipitous outlines of the granitic summits of the

White mountains of New Hampshire. Its geological formations are the metamorphic slates, gneiss, quartz rock, limestones, &c., of the Laurentian epoch, the general range of which is about N. 15° E., with a prevailing dip of 80° to 55°, and sometimes more, toward the E. These give a comparatively smooth outline to the surface of the hills; and though the soil they produce is not generally fertile, the slopes are covered on the disappearance of the snow in the spring with fine pastures of rich green grass, which may have given to the mountains their name, though this is commonly referred to the growth of evergreen forest trees, as the hemlock, balsam fir, spruce, pine, cedar, &c., which abound upon the poorer lands and along the margins of the streams. Upon the better lands is found the hard wood growth of beech, birch, sugar maple, white oak, ash, &c. For accounts of the mineral products of the mountainous region reference may be made to the articles GOLD, HEMATITE, IRON, MANGANESE, MARBLE, SERPENTINE, SLATE, and VERMONT.

**GREEN RIVER**, a considerable stream rising in Lincoln co., Ky., flowing W. past the Mammoth cave, and, after receiving Big Barren river, bending N. W. and entering the Ohio 9 m. above Evansville in Indiana. It is 200 yards wide at its mouth, and in the lower part of its course is navigable by steamboats at all seasons, while, by means of dams and locks, small steam vessels can ascend to Greensburg, a distance of 200 m. Total length, about 800 m. The upper part of its valley is occupied by cavernous limestone, and the lower abounds in coal.

**GREEN RIVER**, a N. E. co. of Utah, extending from the crest of the Rocky mountains 200 m. westerly, with a breadth of about 80 m., and intersected by a stream from which it takes its name; area, 16,000 sq. m. The surface is mountainous, and the only arable land is said to be certain narrow strips in the valleys. The county has been erected since 1850. Capital, Fort Bridger.

**GREEN VITRIOL**. See COPPERAS.

**GREENBRIER**, a central co. of Va., intersected by Greenbrier river, from which it derives its name, and bounded S. E. by a ridge of the Alleghanies; area, 880 sq. m.; pop. in 1850, 10,022, of whom 1,817 were slaves. The soil of the valleys is fertile, and the productions in 1850 were 182,119 bushels of Indian corn, 47,778 of wheat, 124,158 of oats, 6,859 tons of hay, and 42,564 lbs. of wool. There were 80 grist mills, 82 saw mills, 1 newspaper office, 22 churches, and 900 pupils attending public schools. The celebrated White Sulphur springs are in this county. Value of real estate in 1856, \$3,288,949, showing an increase since 1850 of 17 per cent. Capital, Lewisburg.

**GREENBUSH**, a post village and township of Rensselaer co., N. Y., on the E. bank of the Hudson, opposite Albany; pop. in 1855, 8,808. It is on the line of the Harlem and Hudson river railroads, and is the terminus of the western railroad, which here connect with other

routes from Albany to different parts of the country. The depots are at a spot locally denominated East Albany, connected by a steam ferry with the city on the opposite bank of the river. In 1855 Greenbush contained 3 churches (Methodist, Presbyterian, and Roman Catholic), 2 saw mills, 3 grist mills, a car factory and repairing shop, a marble yard, a furnace, and a tannery. It was incorporated in 1795, and the town of North Greenbush was separated from it in 1855.

**GREENCASTLE**, a post village, capital of Putnam co., Ind., situated on high table-land 1 m. E. of Walnut fork of Eel river, at the intersection of the Terre Haute and Richmond with the New Albany and Salem railroad; pop. in 1850, 1,382. It is surrounded by a rich agricultural country, and contained in 1850 a court house, gaol, newspaper office, 2 academies, 3 churches, and the Asbury university, an institution under the care of the Methodists.

**GREENE**, the name of 15 counties in the United States. I. A S. E. co. of N. Y., bounded E. by the Hudson river, and drained by Catskill, Schoharie, and Coxsackie rivers; area, 600 sq. m.; pop. in 1855, 31,187. The surface is broken by the Catskill mountains, which are mostly sterile. The valleys and level districts of the N. E. contain some excellent soil, suitable for grain, potatoes, and grazing. The productions in 1855 were 10,521 bushels of wheat, 160,907 of oats, 99,204 of Indian corn, 116,871 of potatoes, 58,524 tons of hay, and 1,191,930 lbs. of butter. There were 27 grist mills, 62 saw mills, 4 furnaces, 5 woollen mills, 9 tanneries, 7 paper mills, 5 newspaper offices, 141 school houses, and 74 churches. Capital, Catskill. Named in honor of Gen. Nathanael Greene. II. A S. W. co. of Penn., bounded S. and W. by Virginia, and E. by the Monongahela, watered by several small streams, and abounding in bituminous coal; area, 600 sq. m.; pop. in 1850, 22,186. It has a hilly surface and a fertile soil. The productions in 1850 were 189,149 bushels of wheat, 270,270 of oats, 556,684 of Indian corn, 15,086 tons of hay, and 459,180 lbs. of butter. There were 26 grist mills, 7 saw mills, 12 tanneries, 7 distilleries, 1 manufactory of glass, 43 churches, 3 newspaper offices, and 4,257 pupils attending public schools. Capital, Waynesburg. III. A central co. of Va., lying partly on the S. E. slope of the Blue Ridge, and bounded N. E. by Rapidan river; area, 930 sq. m.; pop. in 1850, 4,400, of whom 1,699 were slaves. It has an uneven surface, traversed by some fertile valleys. The productions in 1850 were 42,416 bushels of wheat, 137,393 of Indian corn, and 200,714 lbs. of tobacco. There were 6 grist mills, 4 saw mills, 8 churches, and 152 pupils attending public schools. Value of real estate in 1856, \$944,674, showing an increase of 33 per cent. since 1850. Capital, Stauntonville. IV. An E. co. of N. C., drained by the Contentny, an affluent of Neuse river; area, about 280 sq. m.; pop. in 1850, 6,619, of whom 3,244 were slaves. The surface is level and the soil fertile. Marl is found in several

places. The productions in 1850 were 268,870 bushels of Indian corn, 78,880 of sweet potatoes, and 178 bales of cotton. There were 4 saw mills, 31 tar and turpentine factories, 25 grist mills, 12 churches, and 420 pupils attending public schools. Capital, Snow Hill. V. A central co. of Ga., bounded S. W. by the Appalachee and Oconee rivers, the latter of which intersects the N. W. part; area, 874 sq. m.; pop. in 1852, 18,176, of whom 8,322 were slaves. It has a hilly surface, and the soil, though originally fertile, is partly worn out. In 1850 the productions were 480,326 bushels of Indian corn, 96,787 of oats, 85,296 of sweet potatoes, and 12,600 bales of cotton. There were 6 saw mills, 1 grist mill, 2 cotton factories, 2 newspaper offices, 22 churches, and 408 pupils attending public schools. Value of real estate in 1856, \$317,249. The county is intersected by the Georgia and Athens branch railroads. Capital, Greensborough. VI. A W. co. of Ala., intersected by Black Warrior river, and bounded S. W. by the Tombigbee, the 2 streams uniting at the S. W. extremity of the county, and being navigable by steamboats during about half the year; area, 990 sq. m.; pop. in 1850, 81,441, of whom 22,127 were slaves. The surface is moderately uneven, the soil is fertile, and the staples are cotton and maize. The productions in 1850 were 1,386,144 bushels of Indian corn, 121,658 of oats, 268,267 of sweet potatoes, and 25,680 bales of cotton. There were 8 grist mills, 10 saw mills, 2 machine shops, 5 tanneries, 3 newspaper offices, 85 churches, and 715 pupils attending public schools. Capital, Eutaw. VII. A S. E. co. of Miss., bordering on Alabama, drained by Chickasawha and Leaf rivers, which unite in the S. part to form the Pascagoula; area, 880 sq. m.; pop. in 1850, 2,018, of whom 638 were slaves. It has an undulating surface and a soil of only moderate fertility, which supports some pine forests. The productions in 1850 were 41,275 bushels of Indian corn, 17,236 of sweet potatoes, and 80,810 lbs. of rice. There were 10 grist mills, 11 churches, and 187 pupils attending schools and academies. The county is traversed by the Mobile and Ohio railroad. Capital, Leakesville. VIII. A N. E. co. of Ark., bounded N. by Missouri, and separated from it on the E. by St. Francis river; area, 950 sq. m.; pop. in 1854, 3,570, of whom 86 were slaves. The surface is level, and the soil of the river bottoms fertile. The productions in 1854 were 3,768 bushels of wheat, 218,827 of Indian corn, 17,715 of oats, and 218 bales of cotton. Capital, Gainesville. IX. A N. E. co. of Tenn., bordering on N. Carolina, and traversed by Nolichucky river; area, 750 sq. m.; pop. in 1850, 17,824, of whom 1,093 were slaves. It contains valuable beds of iron ore. The surface is elevated, uneven, and well timbered. The productions in 1850 were 99,970 bushels of wheat, 243,088 of oats, 784,381 of Indian corn, and 191,184 lbs. of butter. There were 50 grist mills, 7 saw mills, 9 tanneries, 1 newspaper office, 39 churches

and 516 pupils attending public schools. The East Tennessee and Virginia railroad passes through Greeneville, the county seat. X. A central co. of Ky., intersected by Green river, which is navigable by steamboats, and drained by several small streams; area, 525 sq. m.; pop. in 1850, 9,060, of whom 2,608 were slaves. It contains much excellent limestone and a number of salt springs. The surface is undulating and hilly. The productions in 1850 were 19,870 bushels of wheat, 114,111 of oats, 505,757 of Indian corn, 1,267,971 lbs. of tobacco, 20,934 of wool, and 118,132 of flax. There were 3 grist mills, 5 saw mills, 3 tanneries, 14 churches, and 649 pupils attending public schools. Capital, Greensburg. XI. A S. W. co. of Ohio, watered by Mad and Little Miami rivers; area, 432 sq. m.; pop. in 1850, 21,946. It contains limestone and some variegated marble. The surface is undulating, and the soil consists of fertile clay. The productions in 1850 were 241,794 bushels of wheat, 115,714 of oats, 1,219,944 of Indian corn, and 15,704 tons of hay. There were 65 churches, 1 newspaper office, 21 grist mills, 28 saw mills, and 2,215 pupils attending public schools. The Dayton, Xenia, and Belpre, the Columbus and Xenia, the Little Miami, the Lebanon and Xenia, and the Delaware and Xenia railroads centre at Xenia, the county seat. XII. A S. W. co. of Indiana, drained by the W. fork of White river; area, 540 sq. m.; pop. in 1850, 12,318. It is diversified by prairies, oak openings, and forests, and has a rich soil. The productions in 1850 were 33,091 bushels of wheat, 64,083 of oats, 615,050 of Indian corn, and 2,036 tons of hay. There were 25 grist mills, 11 saw mills, 9 churches, and 2,846 pupils attending public schools. The Wabash and Erie canal passes through the county. Capital, Bloomfield. XIII. A W. co. of Ill., bounded W. by the Illinois river; area, 500 sq. m.; pop. in 1855, 18,092. It has a rolling surface and a fertile soil. The productions in 1850 were 168,822 bushels of wheat, 104,952 of oats, 1,346,973 of Indian corn, and 186,222 lbs. of butter. There were 29 churches, 2 newspaper offices, and 1,700 pupils attending public schools. The county contains an abundance of anthracite coal and timber. It is intersected by the Jacksonville and Carrollton railroad. Capital, Carrollton. XIV. A S. W. co. of Mo., drained by branches of the Osage and White rivers; area, 1,218 sq. m.; pop. in 1856, 14,124, of whom 1,492 were slaves. The surface is diversified, and occupied by alternate forests and prairies. Limestone and lead are found. The soil is fertile, and the productions in 1850 were 61,306 bushels of wheat, 288,769 of oats, 1,110,987 of Indian corn, and 806,757 lbs. of butter. There were 8 churches, 2 newspaper offices, and 259 pupils attending public schools. Capital, Springfield. XV. A central co. of Iowa, intersected by the Raccoon river; area, 600 sq. m.; pop. in 1856, 1,089. It consists mostly of prairies. The productions in 1856 were 1,074 bushels of wheat,

1,978 of oats, 52,328 of Indian corn, and 5,083 lbs. of butter.

**GREENE, CHRISTOPHER**, an American revolutionary soldier, born in Warwick, R. I., in 1787, killed near the Croton river, Westchester co., N. Y., May 18, 1781. He was among the first to take the field on the patriotic side after the engagements at Lexington and Concord. Subsequently, as colonel of a Rhode Island regiment, he participated in the campaign in Canada under Arnold. In 1777, while in command of Fort Mercer at Red Bank, on the Delaware, he sustained an attack from a large force of Hessians under Col. Donop, who were repulsed with great slaughter. For these services a sword was voted him by congress, and a monument commemorative of the battle and of the valor of the American commander was erected in the neighborhood of Fort Mercer in 1829. Col. Greene lost his life in an encounter with a superior body of tory dragoons who had surprised his post. He defended himself with great valor, killing several of the enemy with his own hand, but was finally overpowered by numbers.

**GREENE, GEORGE WASHINGTON**, an American author, born in East Greenwich, R. I., April 8, 1811. He is a grandson of Nathanael Greene, the revolutionary general. He was obliged by ill health to leave Brown university in his junior year in 1837, and resided from that time in Europe, with the exception of a few short visits home, until 1847. From 1837 to 1845 he was U. S. consul at Rome. While in Italy he planned a history of that country, for which he collected many materials, but which the failure of his eyesight obliged him to lay aside. Between 1835 and 1850 he published a series of essays in the "North American Review," chiefly on Italian literature and history, which were collected in a volume entitled "Historical Studies" (New York, 1850). On his return to the United States he became professor of modern languages in Brown university, and edited several textbooks, among which were a new edition of Putz and Arnold's "Ancient Geography and History" (New York, 1849), and a "History and Geography of the Middle Ages" (New York, 1851). In 1852 he removed to New York, where he has contributed many papers to magazines, and edited in 1854 a complete edition of Addison's works, in 6 vols. He furnished the life of Gen. Nathanael Greene in Sparks's "American Biography," and is now (1859) preparing his official papers and public and private letters for the press, in connection with a new and elaborate biography of him.

**GREENE, NATHANAEL**, an American revolutionary general, born at Potowhommet, Warwick co., R. I., May 27, 1742, died June 19, 1786. Potowhommet was an estate at the head waters of a small tributary of Narraganset bay, on which his father, a leading preacher among the Quakers, had built an anchor forge and a grist mill. He was brought up as a Quaker, receiving the simple education of a country boy in the

early days of the colony, and trained from childhood to work on the farm and at the forge, and take his turn with his brothers in watching the mill. While yet a boy a casual intercourse with a young student of Rhode Island college awakened his thirst for knowledge, and resolute perseverance in the midst of many obstacles gave him in the course of time a more than ordinary familiarity with ancient and English history, geometry, law, and moral and political science. In 1770 he was chosen a member of the general assembly for Coventry, whither he had removed to take charge of another forge, which, with his father and brothers, he had added to the original stock; and from that time he continued to take an active part in public affairs till the close of the war. He was the first to establish a public school in Coventry, and one of the first to engage in the military exercises which prepared the way for resistance to the encroachments of the mother country. This open renunciation of the principle of his sect was promptly followed by a formal excommunication. In 1774 he joined the Kentish guards as a private, having failed to obtain a lieutenancy. In July of the same year he was married to Catharine Littlefield of Block island, and in May, 1775, was appointed by the general assembly to command as brigadier-general the Rhode Island contingent to the army before Boston. He joined his command at Roxbury on June 8, and from that time remained in active service without a day's furlough till the final disbandment of the army in 1783. At Boston his brigade was distinguished by its discipline; and although no opportunity offered for the display of his peculiar talents, he won for himself the love and confidence of Washington from the beginning of their intercourse. After the evacuation of Boston he was intrusted with the defence of Long island, but unfortunately was stricken down by a fever a few days before it was attacked by the British; a circumstance which has always been supposed to have contributed materially to the unfortunate result of the battle. In September he was made major-general, and appointed to the command in New Jersey. At Trenton he led the division with which Washington marched in person, and, with Knox, was for following up the advantages of that brilliant surprise by advancing directly upon the other detachments of the enemy. He took an equal part in the battle of Princeton, and was intrusted by Washington during the winter with a confidential communication to congress. At the Brandywine he commanded a division, and by a rapid march and successful stand preserved the army from utter destruction. At Germantown he commanded the left wing which penetrated into the village. On March 2, 1778, he accepted, at the urgent solicitation of Washington and the committee of congress, the office of quartermaster-general, which he held till Aug. 1780, fulfilling its arduous and complicated duties in such a manner as to call forth from Washington when he left

it the declaration "that the states have had in you, in my opinion, an able, upright, and diligent servant." At Monmouth he commanded the right wing. He took an active part in the attempt upon Newport in 1778, commanding the right wing in the battle of Tiverton heights. On June 23, 1780, he checked with two brigades and a small body of militia the advance of a corps of 5,000 of the enemy in the brilliant battle of Springfield. He was in command of the army during Gen. Washington's visit to Hartford in Sept. 1780, when Arnold's conspiracy was discovered, and sat as president of the court of inquiry upon Major André. On Oct. 14 of the same year he was appointed to the command of the southern army, which he found on his arrival, Dec. 2, in a state of utter disorganization and want. On the 20th he advanced to a well chosen camp on the banks of the Pedee, and began a series of operations which in less than a year stripped the enemy of nearly all their hard-won conquests in the two Carolinas and Georgia, and shut them up within the narrow limits of Charleston and its immediate neighborhood. The events of this active year were the battle of the Cowpens, won by Gen. Morgan at the opening of the campaign; a brilliant retreat from the Catawba to the Dan; the return into North Carolina, in which Gen. Greene maintained his position for two weeks within striking distance of a superior enemy, in such a manner as both to avoid an engagement and cover the roads by which his reinforcements were coming; the battle of Guilford Court House, in which he lost the field, but gained the end for which he fought; the pursuit of Cornwallis to the Deep river; the daring advance into South Carolina; the battle of Hobkirk's hill, a second defeat followed by the results of victory; the siege of Fort Ninety-Six, raised by the advance of Lord Rawdon, but followed by the immediate evacuation of the post and the retreat of the enemy toward the west; the drawn battle of Eutaw Springs, the hardest fought field of the revolution; and the advance upon Dorchester, spoken of by Washington "as another proof of the singular abilities of" Gen. Greene. The active campaign of 1781 was followed by a year and a half of trials and embarrassment, which called into play his civil and administrative talents rather than those of the soldier; and no one welcomed more sincerely the return of peace. Congress presented him with a medal for the battle of Eutaw Springs, and two of the cannon taken from the enemy for his general services. North and South Carolina and Georgia made him valuable grants of property. After passing a year in Rhode Island, he removed his family to Mulberry Grove on the Savannah river, where he died of a stroke of the sun. A monument was voted by congress, but never erected; and all traces of his burial place have been lost. He left 2 sons and 8 daughters, and an estate seriously embarrassed by the efforts which

he had made in 1788 to feed and clothe his army.

GREENE, NATHANIEL, an American author and journalist, born in Boscawen, N. H., May 20, 1797. At the age of 12 he entered the office of the "New Hampshire Patriot," published at Concord, and at 15 became editor of the "Concord Gazette," continuing to discharge the duties of that station until the beginning of 1814. Removing to Portsmouth, he edited for a year the "New Hampshire Gazette," the oldest newspaper in New England. In the spring of 1815 he took up his residence at Haverhill, Mass., where for two years he conducted the "Haverhill Gazette." He commenced the publication of the "Essex Patriot," in Haverhill, in May, 1817, and conducted it for nearly 4 years, when he accepted an invitation to remove to Boston, for the purpose of establishing a new democratic paper in that city. The first number of this paper, known as the "Boston Statesman," and published semi-weekly, appeared Feb. 6, 1821. During the administration of J. Q. Adams the paper was opposed to the almost unanimous sentiment of the city and the state; but in 1829, when the general government passed into the hands of the democratic party, President Jackson appointed Mr. Greene postmaster of Boston. From the income derived from this office Mr. Greene discharged the debts he had incurred, amounting to many thousand dollars, during more than 8 years of worse than profitless journalism. He held the office for 12 years, without interruption, under Presidents Jackson and Van Buren; but was removed in 1841, when the whigs had obtained possession of the national government. In 1844 he was reappointed to it by President Tyler, and remained in it until the spring of 1849, when he was removed, the whigs having elected Gen. Taylor to the presidency. Shortly afterward he went to Europe, and is now (Oct. 1859) residing in France. In 1836 he translated a "History of Italy," from the Italian of Sforzozzi, which was followed by the translation of 2 volumes of "Tales from the German" (Boston, 1837). Six years later he published "Tales and Sketches from the French, German, and Italian."—CHARLES GORDON, an American journalist and politician, brother of the preceding, born in Boscawen, N. H., July 1, 1804. At an early age he was placed in the office of the "Essex Patriot," then conducted by his elder brother, at Haverhill, as an apprentice, whence he was removed to a printing office at Exeter. At 18 he went to Boston, and became connected with the "Statesman," his brother's journal. In 1825 he took charge of the "Free Press" at Taunton, which he conducted for a year. Returning to Boston, he published a literary paper, the "Spectator," after which he resumed his connection with the "Statesman." In 1827 he took up his residence in Philadelphia, and was one of the conductors of the "National Palladium," the first Pennsylvania journal that advocated the election of Gen. Jackson to the presidency.



In 1828 he was employed in the office of the U. S. "Telegraph," conducted by Gen. Duff Green, at Washington, then the principal journal of the democratic party. After the election of Gen. Jackson he returned to Boston, and succeeded his brother Nathaniel as one of the proprietors and publishers of the "Statesman," of which he finally became sole proprietor. On Nov. 9, 1831, he issued the first number of the Boston "Morning Post." At that time there was scarcely a democratic party in Massachusetts, the democratic vote of that year being only 5,800; but in 1839 the democratic vote reached 50,000, electing Marcus Morton governor, who appointed Mr. Greene one of his aides-de-camp, which office he held during 1840. The democrats were again successful in 1842, their candidate for governor receiving 56,490 votes. Much of their success was due to Col. Greene. He has several times been a candidate for congress, and for a seat in both branches of the legislature of Massachusetts; but he has been successful in this respect but once, being chosen a representative from Boston. He has also been nominated as a presidential elector. In 1853 President Pierce appointed him naval officer of the port of Boston, and he was reappointed to the same post in 1857, by President Buchanan.

GREENE, ROBERT, an English dramatist and miscellaneous writer, born in Norwich about 1560, died in London, Sept. 8, 1592. He was educated at Cambridge, and studied for a while also at Oxford. Although bred to the medical, or according to some accounts to the clerical profession, he followed the career of an author, rivalling his brother dramatists, if not always in dramatic power, at least in profligacy. His life, alternately spent in plenty and penury, terminated miserably. Being deserted by all his friends, he was indebted for shelter and attendance in his last sickness to the pity of a poor cobbler and his wife. He was a prolific writer, and in addition to his dramas, of which only 5 that are certainly his have come down to us, wrote poems, tales, and pamphlets. Some of his poems are characterized by much elegance of diction. His tale of "Pandosto, or the Historie of Dorastus and Faunia," afforded to Shakespeare the plot for his "Winter's Tale." In his latest work, "A Groat's Worth of Wit," Greene alludes to Shakespeare as "an upstart crow beautified with our feathers—in his own conceit the only *shake-scene* in a country." An edition of Greene's dramatic and poetical works was published by the Rev. A. Dyce in 1831 (2 vols. 8vo.).

GREENESVILLE, a S. E. co. of Va., bordering on N. Carolina, and bounded N. by Notoway river; area, 800 sq. m.; pop. in 1850, 5,639, of whom 3,785 were slaves. The surface is level and the soil moderately fertile. The productions in 1850 were 17,619 bushels of wheat, 211,537 of Indian corn, 188,000 lbs. of tobacco, and 715 bales of cotton. There were 1 grist mill, 1 iron foundry, 12 churches, and 125

pupils attending academies and schools. Value of real estate in 1856, \$793,759, showing an increase of 44 per cent. since 1850. The railroad from Petersburg to Weldon passes through Hicksford, the capital, where it is joined by a branch railroad from Gaston, N. C. Organized in 1784.

GREENFIELD, the shire town of Franklin co., Mass., on the W. bank of the Connecticut river, 20 m. N. from Northampton and 90 m. W. N. W. from Boston; pop. in 1855, 2,945. It is situated at the junction of a branch of the Vermont and Massachusetts with the Connecticut river railroad, and will be connected with Albany and Troy by a railroad now in course of construction. It is supplied with water power by Green and Fall rivers, the latter of which forms part of its E. boundary. Beside the county buildings it contained in 1855 an extensive manufactory of cassimere, producing \$150,000 worth of goods per annum, a furnace casting \$16,000 worth of hollow ware, &c., 2 carriage factories, a tannery, several harness, furniture, and tinware manufactories, brick yards, &c. The town is largely engaged in the manufacture of cutlery and mechanics' tools. The first manufactory of table cutlery in the United States was established here by Mr. John Russell, in 1834, under the name of the Green river manufacturing company (see CUTLERY), and having been destroyed by fire in 1836 was rebuilt near Greenfield village, but within the boundaries of the town of Deerfield. The J. Russell manufacturing company of table cutlery began operations in 1855. In 1859 Greenfield contained 6 churches, 1 Baptist, 8 Congregational, 1 Episcopal, and 1 Methodist, a high school, 2 newspaper offices, 2 banks, and a savings bank. The town was separated from Deerfield in 1753.—Fossil footprints of the *Dontosaurus giganteum* have been discovered in the vicinity. (See DEANE, JAMES, M.D., and FOSSIL FOOTPRINTS.)

GREENHOUSE, a building for raising and preserving plants which are too delicate to live in the open air during the whole or part of the year. In a greenhouse the plants are grown in pots or tubs which are ranged on shelves or benches; in a conservatory they are planted in the free soil; an orangery is a building with an opaque roof, and is used chiefly for preserving during winter those plants which sprout and flower during summer in the open air, and for cultivating exotics of the class from which it is named. A greenhouse has its roof and at least one side of glass, in order to admit as much light as possible, without which it is found that pot plants will lack symmetry of growth. One of the best forms of construction is the following: a brick wall about one foot high is built around the front and ends; the rear wall is also of brick, about 8 feet high, and the whole is covered with a span roof, the apex of which should be at least 10 or 12 feet above the floor, and the front supported by a row of glass sashes 18 inches high resting on the front

wall. The ends may be advantageously filled in with glass. The longer slope of the roof should face the south, though this is not essential. A uniform and proper temperature is maintained during cold weather by artificial means, one of the commonest forms of heating apparatus being a brick furnace, adapted to anthracite coal, and set in a pit sunk in the floor of a small room outside the area of the greenhouse. The smoke pipe, of brick or tiles, enters the house horizontally, passing its entire length in front, and entering a chimney placed at one corner. When more heat is required, a system of hot water copper pipes is used on the circulating plan. The temperature, however, should be rather low. Such plants as need an extra heat can be set upon a latticed shelf extending along the upper surface of the flue, or placed in a hothouse. The chief part of the pots or tubs containing plants is arranged on a staging which runs through the centre of the house from end to end, a wide passage way being left on either side. A free current of air is necessary to carry off the moisture thrown out from the plants by perspiration, and the pots must therefore not be placed too close together. The staging is constructed in the form of a series of steps, the smallest plants usually being placed on the lowest shelf, which is about 3 or 4 feet from the floor. In this way a mixed group of auriculas, primroses, roses, heaths, geraniums, cinerarias, eupatoriums, fuchsias, salvias, lantanas, justicias, polygalas, acacias, azaleas, daphnes, verbenas, petunias, stock-gillies, wall flowers, &c., may face the front; and on the rear of the stage, where there is less light, may be arranged camellias and similar plants. Just under the apex of the roof, upon narrow shelves supported by iron rods, heliotropes may be disposed with their stems hanging gracefully downward. Similar shelves in front of the house and over the flues may be appropriated to Cape bulbs, such as *ixias*, *gladioluses*, *oxalis*, *cyclamens*, and the smaller *amaryllids*, which are admirable winter flowers. Tuberous-rooted or tender herbaceous plants which are to be turned into the beds in spring may be kept beneath the stage, care being taken to prevent decay. Upon the rafters vines and climbing roses should be trained. The practice of training grapes on the rafters is not recommended, as it interferes with the legitimate object of the greenhouse, and the fruit is not so well developed as it would be in a grapery. The floor of the passage way, made of tiles, flagging, or cement, should be kept perfectly clean and dry. A cistern can be built beneath the floor to catch the rain from the roof, and will be found convenient in watering the plants. The solid walls of the building should be painted white or plastered on the inside. Many of the plants kept in greenhouses are removed to the open air in spring, but there are others which require shelter all the year round. Among the favorite summer-blooming greenhouse plants are several varieties of the *achi-*

*menes*, a native of Mexico and the West Indies, with flowers of every color, growing best in a soil of equal parts of turfy loam, peat earth, and leaf mould, with a little sand and charcoal, requiring much moisture but good drainage, and after they have done flowering dying down to the roots, which send out fresh shoots the next season; the *gloxinia*, of various colors, with tuberous roots, planted in the spring in soil like that used for the *achimenes*; the *gesneras*, dying down annually, except in a few instances; the *fuchsias*; the *torrenia Asiatica*, a native of the East Indies, a plant of easy growth, large size, and rich blossoms; the *calceolarias*, which require careful shelter from the air, remarkable for their grotesque crimson and orange flowers; various kinds of balsams; day lilies, as the *agapanthus*, *hermoccallis Japonica*, and *lilium speciosum*; foreign ferns and the tropical selaginellas, which thrive best in the coolest and most shaded parts of the greenhouse; many kinds of climbers, as the *Thunbergia*, *Maurandia*, passion flower, *cobaea scandens*, *lophospermum*, *Kennedia*, *Sollya*, *Schubertia*, *Manettia*, and *tropeolum*.—Among the obstacles to success in greenhouse cultivation are blight, mildew, and the like, which sometimes appear upon the foliage. The leaves of the orange and lemon are often covered with a black smutty fungus, which should be washed off with soap and water; those of the camellia with dust, which may be removed with a dry woollen rag. Roses are subject to a mildew which curls the leaves and causes them to droop. Some of the commonest insect pests are the red spider, a small acarus which eats the epidermis and turns the leaves to a dusky red; the *coccus* or scale bug, found on the stems of hard-wooded plants; the mealy bug, which infests cactuses and climbing vines; and the green louse (*aphis*), which is easily destroyed by the fumes of tobacco.

GREENHOW, ROBERT, an American author, born in Richmond, Va., in 1800, died in San Francisco, Cal., in 1854. He was the son of Robert Greenhow, who was for a time mayor of Richmond. His mother perished in the terrible conflagration of the Richmond theatre, Dec. 26, 1811. In 1815 he went to New York, where he studied medicine, attending lectures at the college of physicians and surgeons, and taking his degree of M.D. in 1821. Subsequently he visited Europe, and became intimately acquainted with Lord Byron. After his return to New York he delivered a course of lectures on chemistry before the literary and philosophical society. In 1828 he was appointed translator to the department of state at Washington. In 1837 he made a report upon the discovery of the N. W. coast of North America, which was printed by order of congress. This he afterward enlarged, and published under the title of "History of Oregon and California" (1 vol. 8vo., New York, 1846). In 1850 he went to California, where in 1853 he was appointed associate land agent to the U. S. land commission for the determination of Cal-

ifornia claims. In the following year, while walking about San Francisco on a dark night, he fell into a deep excavation in one of the streets and broke his thigh, of which injury he soon died. Dr. Greenhow had an extraordinary memory, and his faculty of remembering what he had heard or read is said to have been surpassed in recent times only by that of the historian Niebuhr.

GREENLAND, or GROENLAND, an isolated body of land having the dimensions of a continent, lying to the N. E. of North America. From its S. point, at the island of Cape Farewell, in lat.  $59^{\circ} 49'$  N., it stretches on its W. side toward the N. pole, and on the E. toward the N. E., attaining in lat.  $70^{\circ}$  a breadth of 600 m., which it thence maintains into the extreme polar latitudes reached by man. Upon the arctic circle it is separated from Iceland by about 800 m.; and on the W. side, between it and the opposite coast of the continent of North America and the islands N. of this continent, lies Davis's strait, expanding northward into Baffin's bay, and this succeeded in lat.  $78^{\circ}$  and  $79^{\circ}$  by Smith's sound, which through Kennedy channel leads in about lat.  $81^{\circ}$ – $82^{\circ}$  into the open polar sea, as described by Dr. Kane. The country was discovered toward the end of the 9th century by an Icelander named Gunbiörn, who was driven in a storm westward from Iceland not many years after the settlement of that island by the Norsemen. He called it Hvidsserk (white shirt), from its snowy southern headland. The name Greenland was afterward given it by another Icelander, Erikr Rauði (Eric the Red), who, expelled from Iceland for killing another chief, spent 8 years in exploring the new country, and returned with such flattering reports of its beauty and verdure, that he succeeded in fitting out an expedition of 25 vessels to return to it. This was in 985 or 986. Half the adventurers were lost in the ice; the remainder formed two settlements on the W. coast. It was this Erikr, and his son Leifr, who are believed to have reached the coast of New England in the year 1000, and to have made a settlement on the banks of Taunton river. The Greenland settlements, separated by 80 m. of desert, were called West Bygd and East Bygd. The former at one time is said to have had 4 churches and 90 farms, or as some state 110; and the other 2 towns, a cathedral, 11 churches, 190 farms, and at least 2 monasteries. The people maintained themselves by raising cattle and sheep, the pasturage being good on the flocks, though the interior of the country was covered with ice. The reindeer, walrus, and seal also added to their means of subsistence. About the middle of the 14th century the west colony suffered by pestilence and hostile invasions of the aboriginal Esquimaux, called by the Norsemen Skrælings, till it was at last exterminated; and in the next century East Bygd, after a succession of calamities, was destroyed by a hostile fleet, supposed to be English. The settlements

of the early Scandinavians appear to have been pushed as far N. as lat.  $73^{\circ}$ , there having been found in 1824 a stone carved with Runic characters designating the spot as having been cleared, and the inscription made in April, 1135. Greenland was next visited by Frobiisher in his voyages in search of a N. W. passage. He called the country on the W. side Friseland, the name Greenland being applied to the S. point and E. coast. On his third voyage, in 1573, he took possession of a portion of the W. coast in the name of Queen Elizabeth, and called it West England. Davis, on his voyages 7, 8, and 9 years later, named a portion of the coast still further N. on this side the Land of Desolation. The E. coast was explored by Hendrik Hudson in 1607 very far to the N., in a bold attempt to make the N. W. passage in this direction; and in lat.  $78^{\circ} 30'$  he named a cape Hold with Hope. From this, steering N. E. he came in sight of Spitzbergen, and afterward saw land stretching from lat.  $81^{\circ} 30'$  to  $82^{\circ}$ , which is supposed to be the continuation of the Greenland coast, the land nearest to the pole seen by man, except Mt. Parry of the Grinnell Land. W. of Kennedy channel, discovered by Dr. Kane. In 1616 Baffin, in a vessel of only 55 tons, explored the bay called by his name, and also the strait or sound which he named after Sir Thomas Smith. No more settlements were made by Europeans until the year 1721, when Hans Egede, a clergyman, removed with his family from Norway to Godthaab or Good Hope, in lat.  $64^{\circ}$ , on the W. coast. Since that time the Danes have established many settlements on this side up to lat.  $78^{\circ}$ , and the colonies have been greatly aided through the business brought to them by the whaling expeditions sent out from the United States and Europe. The colonies, 18 in number, beside some establishments called factories, are comprised in two inspectorships or divisions, called respectively North and South Greenland, the former N. and the other S. of lat.  $67^{\circ}$ . The population of the 7 colonies of the former division in 1845 was 3,079, of whom 110 were Danes, the rest natives; of the 6 colonies of the latter, 5,656, of whom 124 were Danes. Julianeshaab, or Juliana's Hope, is the principal and most southern colony, extending some distance around the E. coast. Its population in 1845 was 2,386, of whom 41 were Danes. The other colonies of S. Greenland are Frederikstahl, which supplies the Danish market with the valued fur of the saddleback seal; Fiskermas, or Fish Point, where the seal fishery by nets is largely carried on; Godthaab, the residence of the inspector, and near the Moravian settlement of New Herrnhut; Sukkertoppen, or Sugar Loaf, so called from a wild isolated peak, rising some 8,000 feet above the sea, and famous for its good harbor. Of N. Greenland the colonies are Egedesminde, or Egede's Memory, on a number of islands in Disco bay, known for its seal fishery and eider down; Christianshaab; Jacobshavn; Rittenbenk; Godhavn, in lat.  $69^{\circ} 12'$ , the seat of the inspector of N. Green-

land, and having a coal mine which supplies the other settlements of Disco bay with that article; Omenak, known for its seal fishery and its coal mines; Upernavik, in lat.  $72^{\circ} 40'$ , the most northern of all, one of the newest, and one of the most important in N. Greenland. In 1851 the total population of all the colonies was estimated at 2,400, of whom 250 were Danes. The settlements of the Esquimaux are found as far N. on the W. coast as lat.  $78^{\circ} 20'$ . Dr. Kane describes one called Etah in Hartstene bay, which comprised a few families; their numbers, however, were rapidly diminishing by famine, hardship, and disease, so that it promised soon to become extinct. With the exception of the 3 settlements in S. Greenland of New Herrnhut, Lichtenfels, and Frederikstahl, which belong to the Moravian missions, the entire coast is Lutheran. Dr. Kane remarks that the Lutheran missions, although distinct in organization from the royal Greenland company, are nevertheless under the direct patronage of government, and administered by a board appointed by the crown. The Moravians have no special facilities, and are dependent for their supplies upon private negotiations and the courtesy of the Danish trading vessels. The E. coast has been rarely visited by European explorers. Capt. Scoresby, while engaged in the whale fishery in 1822, explored it from  $69^{\circ} 10'$  to  $74^{\circ} 30'$ , and gave to it the name of Liverpool coast. Two large inlets, one in lat.  $72^{\circ}$  and the other in lat.  $70^{\circ} 15'$ , he called respectively Davy's sound and Scoresby's sound; and in his journal of the voyage, published in 1823, he gave a detailed account of the country. From the great apparent extent of the inlets he was of opinion that they connected westward with Baffin's bay, separating Greenland into a number of islands; a supposition which has not been confirmed by the explorations made on the other side. In 1823 the same coast was examined by Capt. Clavering by order of the British government; and in 1829 and 1830 Capt. Graah, by order of the king of Denmark, traced it in boats from Cape Farewell to lat.  $65^{\circ} 45'$ . The unexplored interval of 840 m., and thence N. to the S. point of Scoresby's examinations, he was obliged to leave by reason of the press of ice upon the shores. Scoresby describes the coast as precipitous, formed of a mountainous chain 3,000 to 4,000 feet in height, with peaks in the interior apparently twice as high. This coast is called by the inhabitants of other parts of the country Lost Greenland, and by reason of its icy barrier it is little known to them. The whole interior of the country is supposed to be a desolate mountainous region covered with perpetual snow and ice; only at times on the precipitous southern sides of the mountains the bare rocks are exposed to view. Owing to the great extent of land stretching toward the N. pole, the climate of Greenland is colder than that of corresponding latitudes further to the east. It is stated that in lat.  $60^{\circ}$  the mean temperature is lower than it is in Lapland in lat.

$72^{\circ}$ . The following estimates of temperature were made from the observations of Dr. Kane from Sept. 1853, to April, 1855 (inclusive), in the vicinity of lat.  $78^{\circ} 37'$  N. and long.  $70^{\circ} 40'$  W.: Jan.,  $-29.42^{\circ}$ ; Feb.,  $-27.40^{\circ}$ ; March,  $-36.03^{\circ}$ ; April,  $-11.30^{\circ}$ ; May,  $+12.89^{\circ}$ ; June,  $+29.23^{\circ}$ ; July,  $+88.40^{\circ}$ ; Aug.,  $+81.85^{\circ}$ ; Sept.,  $+13.48^{\circ}$ ; Oct.,  $-5^{\circ}$ ; Nov.,  $-23.02^{\circ}$ ; Dec.,  $-31.86^{\circ}$ . The maximum of temperature was  $53.9^{\circ}$ , and occurred July 4, 1854. The minimum in that year was  $-68^{\circ}$ , and occurred Feb. 5. On Jan. 7, 1855, the temperature was  $-69.3^{\circ}$ . March, in 1854 and 1855, was a colder month than either February or January. In these latitudes through June and July the sun is constantly above the horizon, and soon causes the ice, that for the chief portion of the year has lined the coasts and spread over the bays and ocean, to be broken up and float off toward the south in the great polar currents. The icebergs which during this season leave the coasts of Greenland are also produced from the great glaciers that are ever moving down from the mountains of the interior, and after entering the ocean are detached and rise up in huge masses. At this season small streams flow from the melting of the snow and ice of the interior, and feed a few unimportant lakes, which remain open for a short time. Permanent springs are almost unknown in N. Greenland. Dr. Kane speaks of one as a very unusual occurrence, which he observed at Godhavn, Disco, at the line of junction of the greenstones and basis granites, which had a winter temperature of  $38.5^{\circ}$  F. Giesecke also speaks of a thermal spring which maintains a temperature of  $104^{\circ}$  throughout the year.—It is remarkable that, short and cold as is the summer season of the polar zone, it appears to be more conducive to the growth of plants than is the climate of high mountainous districts which enjoy in warmer latitudes a higher mean temperature. In reporting upon the collection of plants made by Dr. Kane, Mr. Elias Durand regards it as probable that vegetation extends even to the pole itself, where it finds a proper soil, favorable solar exposure, and protection from the winds. The most hardy plant is the *papaver nudicaule*; it was found by Dr. Kane at all the stations of the two voyages, and probably extends to the furthest limits of vegetation. Its leaves and oleaginous seeds are both grateful to the taste and serviceable in scorbutic affections, to which explorers in these regions are particularly liable. Other plants also flourish with the mosses under the deep snows, where they find protection from the intense cold. The northern section from Upernavik to Washington Land yielded more dicotyledonous plants to Dr. Kane than the district S. of this to lat.  $73^{\circ}$ . The collection of plants is described in the appendix of vol. II. of "Arctic Explorations." Together with those described by E. Meyer in 1830 and by Prof. Giesecke in Brewster's "Edinburgh Encyclopedia," in 1832, Mr. Durand enumerates 264 flowering plants, belonging to 109 genera and

86 families, beside a long list of cryptogams or flowerless plants. But even in the extreme southern part, where the flora is the richest, the hardiest trees, as the pines, appear only as shrubs with short horizontal branches. For wood the inhabitants depend upon the fragments that drift to their shores, and for fuel and light they are compelled to use chiefly the blubber of the whale and oil of the seal, walrus, and other sea animals, which they capture. (See ESQUIMAUX.) The intense cold of these regions is by no means uncongenial to animal life. The sea abounds with huge cetaceans, as the great rorqual whale, that sometimes attains a length of 120 feet, and the more valuable mysticetus, or true whale, together with other varieties, which have made these seas the resort of European and American whalers. The arctic shark (*equalus borealis*) is taken for the sake of the oil extracted from the liver, and this is so valuable that it has recently given rise to a considerable trade in N. Greenland, which has extended to the settlement of Proven, nearly as far N. as Upernavik. The oil is extremely pure, resists cold, and is preferred to the best seal oils. The walrus and the seal among the amphibia afford food and clothing, as well as fuel and light, to the inhabitants. Upon the land and on the ice they capture the great polar bear, the arctic fox, and the reindeer. The Esquimaux dog often relapses into a savage state, and roams in packs, hunting the reindeer. Sea fowl in the summer season are wonderfully abundant. As Scoresby states: "The auk, the petrel, and the gull in clustered myriads darken the sky and make the rocks and shores reecho with their wild clang." The eider duck visits in spring the most northern shores of Greenland, and other species together with the geese are common.—The geological formations of Greenland are chiefly interesting from the evidences they afford of great changes that have taken place in the climate of portions of the earth's surface. On the E. coast Capt. Scoresby found the slates of the coal formation containing impressions of extinct species of tropical plants, like those of the same strata in more southern latitudes; and the occurrence of the same formation in Disco bay has been already spoken of. Along the coast the rocks most frequently noticed by navigators are sandstones intersected by trap dikes, metamorphic slates, and granitic and gneiss rocks. The only mineral of importance obtained in the country for exportation has hitherto been the cryolite referred to in ALUMINUM, and also described under its own name in this work. The existence of tin veins, at Eviok near Arksut, has recently (Oct. 1859) been reported to the geological society of London. About 20 veins have been discovered in an area of 1,500 feet by 80, the tin being associated with ores of lead, copper, zinc, iron, and molybdenum, and with cryolite, fluor spar, zircon, and other minerals. An interesting phenomenon has been observed respecting the gradual subsidence of the W. coast of Greenland, first

by Arotander, between 1777 and 1779, and afterward by Capt. Graah in 1823-'4, and by Dr. Pingel in 1830-'32. It appears from various signs and traditions that for the last 4 centuries the coast has been subsiding for an extent of at least 600 miles, or from the frith called Igahka, in lat. 60° 48', to Disco bay. At numerous points along the coast are seen submerged ruins of ancient buildings, some of which, indeed, as the storehouse of the colony of Julianeshab, which was founded in 1776, date back but about three fourths of a century. At Lichtenfels, half a mile W. of Flakernes, the Moravians, who settled there in 1758, have been obliged once or twice in 40 years to move further inland the poles upon which they set their large boats called oomiak or women's boats. The Greenlanders upon this coast, Dr. Pingel states, avoid building their houses near the water's edge. (See "Proceedings of the Geological Society of London," vol. ii., No. 42.)—The principal works on Greenland are: *Greenland's historical Mindesmarker* (3 vols. 8vo., Copenhagen, 1838); Gaimard's *Voyage en Islande et en Groenland* (7 vols. 8vo., Paris, 1840); "A Description of Greenland," by H. Egede, translated from the Danish (London, 1745); "The History of Greenland," by D. Orantz (3 vols. 8vo., London, 1820); "Historical and Descriptive Account of Iceland, Greenland, and the Farøe Islands" (Edinburgh Cabinet Library, 1844).

GREENLEAF, SIMON, an American jurist, born in Newburyport, Mass., Dec. 5, 1783, died in Cambridge, Oct. 6, 1858. He practised law in Maine, was reporter of the supreme court of that state from 1820 to 1832, and during this period published 9 volumes of reports, and a treatise on the "Origin and Principles of Freemasonry" (Portland, 1820). In 1833, at the solicitation of Judge Story, he accepted the office of Royall professor of law in Harvard university. He held this office until 1846, when he exchanged it for the Dane professorship of law. This office he resigned in 1848. In 1840 he published a volume of "Overruled, Denied, and Doubtful Decisions and Dicta," which was expanded in subsequent editions to 3 volumes. In 1846 he published an "Examination of the Testimony of the Four Evangelists, by the Rules of Evidence as administered in Courts of Justice, with an Account of the Trial of Jesus." This work was republished in England at the instance of the highest dignitaries of the English church. In 1849 he published an edition of Cruise's "Digest of the Law of Real Property." But his great work was a "Treatise on the Law of Evidence" (1st vol., 1842; 2d, 1846; 3d, 1858). He received the degree of LL.D. from Harvard university, and for many years was president of the Massachusetts Bible society.

GREENOCK, a parliamentary borough and seaport town of Scotland, co. of Renfrew, on the S. shore of the estuary of the Clyde, 22½ m. by rail from Glasgow; pop. in 1851, 89,891. It stands partly on a narrow plain, and partly on the declivity of a high hill. The commerce of

Greenock is considerable. The registered shipping in 1856 comprised 873 sailing vessels and 24 steamers; tonnage, 74,842. All the steamers of the Clyde touch at this port. The Victoria dock, opened Oct. 17, 1850, is a tidal basin covering an area of 6 acres, and exceeding 80 feet in depth. It cost upward of £120,000.

GREENOUGH, HORATIO, an American sculptor, born in Boston, Sept. 6, 1805, died in Somerville, near Boston, Dec. 18, 1852. When he entered Harvard college at the age of 16 he had already modelled in clay and attempted sculpture. A French sculptor named Binon, resident in Boston, was his first master. During his college career he enjoyed the friendship and advice of Washington Allston, and produced the design from which the present Bunker Hill monument was erected. Before completing his college course he sailed for Marseilles, and thence proceeded to Rome, where he arrived in the autumn of 1825. He had letters to Thorwaldsen, and profited much by his conversation, although, as he has observed, in the mechanical part of the art he learned most from young fellow students. He returned to Boston in 1826, and after modelling busts of John Quincy Adams, Chief Justice Marshall, and others, returned to Italy and fixed his residence in Florence. His first commission was from James Fenimore Cooper, for whom he executed his "Chanting Oherubs," suggested by a portion of one of Raphael's pictures, and of whom he says: "Fenimore Cooper saved me from despair after my second return to Italy. He employed me as I wished to be employed, and has up to this moment been a father to me in kindness." This was the first original group from the chisel of an American sculptor. In 1831 he went to Paris for the purpose of modelling the bust of Lafayette, and, upon his return to Florence, received liberal commissions from his countrymen, principally for busts, to which the example of Cooper in no slight degree contributed. To the same active friend he was indebted for the commission from congress to execute his colossal statue of Washington, which was finished in 1843, after many years' labor, and now stands in front of the national capitol. During this time he executed, among other original works, the "Medora" for Mr. Gilmore of Baltimore; the "Angel Abdiel;" and the "Venus Victrix" in the gallery of the Boston Athenæum. A second commission from congress employed him for some years subsequent to this, and in 1851 he returned to the United States to superintend the placing in its destination in Washington of his group of the "Rescue," in which the triumph of civilization is symbolized. Many vexatious delays prevented the arrival of the work from Italy, and Greenough, unaccustomed by long absence to the turmoil of American life, and the variations of the American climate, was attacked by brain fever, soon after he had commenced a course of lectures on art in Boston, and died after a short but severe illness. A "Memorial of Horatio Greenough,"

published in 1853, contains a collection of his papers on art and other subjects, preceded by a life of the artist by H. T. Tuckerman.

GREENPORT, a post village and port of entry of Southold township, Suffolk co., N. Y., on the S. side of the N. E. point of Long island, 95 m. E. N. E. from New York; pop. in 1855, 1,665. It has an excellent harbor at the entrance to Peconic bay, capacious enough for the largest ships, and seldom obstructed by ice. Whaling and coasting vessels are owned here, and there are several ship-building yards. The village contains 5 or 6 churches, and a newspaper office. It is the E. terminus of the Long Island railroad.

GREENSAND, an important member of the cretaceous group of stratified rocks. In Europe it is found in both divisions of these rocks, the upper and lower, the clay called gault being intermediate. The chalk overlies the greensand; and the Wealden clays, where they appear at all, separate it from the next inferior group, the oolite. In the United States, the greensand is not found throughout the range of the cretaceous group around the southern termination of the Alleghanies and thence west. It is indeed little known except on its range through New Jersey. The tract it occupies, commencing at the N. E. on Sandy Hook bay, extends S. on the coast to Shark inlet, giving a width across the Atlantic outcrop of the formation from N. W. to S. E. of about 18 m. Its length is directed S. W. across the state, the tract gradually growing narrower and terminating in a point at Salem, opposite the N. part of Delaware. Its N. line approaches within 1½ m. of the Delaware at Bordentown, and is but little further back from it a few miles below Camden, opposite Philadelphia. The dip of the formation is toward the S. E. at a small angle. On this side its uppermost strata disappear beneath the sands which cover the country; and on the N. W. come up from beneath its lowest beds the clays, well known at Amboy and other points on their range toward the S. W. for their use in pottery and the manufacture of fire brick. A straw-colored limestone, which occasionally appears overlying the greensand on its S. E. margin, calls to mind by its position and the numerous marine fossils it contains the calcareous strata of Europe known as the chalk. The whole thickness of the strata known as greensand is about 100 feet; but one principal bed is recognized among the other strata of sand and clays and intermixed greensand, which is about 80 feet thick. This is in great part, sometimes wholly, made up of small dark granules, of round form; several are often united in one, and a quantity of them moistened may sometimes be kneaded like clay. The grains are commonly of deep green color, sometimes bluish, and sometimes a dark chocolate; but whatever their external color may be, they are all bright green when well washed, and especially when crushed. Clay and white silicious sand are commonly intermixed in variable proportions with the green-

sand. In some places fossil shells and other marine organic remains abound in the greensand, being grouped together in layers of a few feet in thickness. The species are numerous and often beautifully preserved. This is especially the case with those found in the overlying yellowish limestone; all are extinct. Of 60 shells collected by Lyell, 5 proved to be identical with European species, viz.: *ostrea larca*, *O. vesicularis*, *gryphaea costata*, *pecten quinquecostatus*, *belemnites mucronatus*. Prof. Forbes regarded 15 of the 60 "as good geographical representatives of well known cretaceous fossils of Europe." Beside these organic remains are found teeth and vertebrae of sharks and some other fishes, also teeth and other vestiges of crocodiles and several other saurians, some of gigantic size. Remains of several crustaceous animals, as crabs, are also met with, and finely preserved specimens of various species of the echinodermata, and of zoophytes, sponges, &c. The shells which most abound in the greensand, occasionally making up the principal portion of the layers in which they occur, are gryphaeas, terebratulas, ostreae, belemnites, and the *exogyra costata*, the last named a very common and large bivalve peculiar to the cretaceous group.—The greensand is of importance for its fertilizing property; and this is found to be derived, not from the calcareous nature of its organic remains, but from the green grains which commonly make up the great proportion of its beds. These, as they are found in New Jersey, when separated from adhering sand and clay, present a composition varying only within a limited range, and not differing from that of the greensand near Havre, France, as determined by Berthier. But according to the analysis of Dr. Turner, the same mineral substance of Kent, England, is deficient in the very element, potash, to which its valuable qualities in this country are essentially owing. Some of the same material also met with in Marshfield, Duxbury, and Gay Head, Mass., resembles the English in this particular. The results of the analysis by Dr. S. L. Dana of the variety at Gay Head, and the mean of many analyses of the greensand of New Jersey, as given by Prof. Rogers, are presented, with the others referred to, in the following table:

Constituents.	N. J.	France.	Gay Head.	Eng-land.	Range of New Jersey analyses.
Silica .....	49.5	50.0	56.70	48.5	47.50 to 51.50
Alumina ....	7.3	7.0	13.33	17.0	6.00 to 9.35
Protox. iron ..	23.8	21.0	30.10	22.0	20.86 to 24.74
Potash .....	11.5	10.9	...	trace	9.96 to 12.96
Water .....	7.9	11.0	7.00	7.0	5.50 to 9.50
Lime .....	0.8?	...	1.63	...	only occasionally present, seldom exceeds 0.5 traces.
Magnesia....	trace	...	1.18	3.8	...

The greensand is often injured by sulphate of iron, derived from decomposition of the sulphuret found in some of the sands and clays which cover the stratum. This is washed through by the rains, and is frequently sensible to the taste and the smell in the greensand, and is also seen as an efflorescence together with sulphate of

alumina. These salts are sometimes decomposed where they are brought in contact with carbonate of lime of the fossil shells, and the sulphuric acid uniting with the lime gives rise to sulphate of lime or gypsum. Thus the noxious ingredients disappear, and a valuable auxiliary is added to the fertilizing compound. The same may be artificially and more effectually obtained by the addition of lime and working it into the greensand, with which it is left for a season before using. In New Jersey the greensand (there called marl) is dug from pits during the winter, and brought out upon the fields, where it is spread to be ploughed in. Twenty loads to the acre have been found a more effective application than 200 loads of good stable manure. The effect is experienced with the first crop, and continues for several years afterward.—Concerning the real nature and origin of the greensand grains nothing was known until, by the recent investigations of Ehrenberg, they were shown to be in many instances the casts of the microscopic shells of *polythalamia* (the many-chambered) and some other organic bodies. The shells themselves had disappeared; but the internal form of their cavities was retained in the more durable silicate of iron, which took the place of the animal bodies as these decayed, and preserved their shapes. Even the very finest canals of the cell walls, and all their connecting tubes, are thus petrified and separately exhibited. Many of the grains which cannot be recognized as of this origin, still suggest some connection with animal bodies by their forms being sometimes lobed and again presenting the appearance of coprolites. Prof. Bailey by his experiments confirmed the conclusions of Ehrenberg, and, extending his investigations to cretaceous rocks from Alabama and W. Texas, found attached to them grains of greensand exhibiting the same phenomena. From specimens of marl and limestone of the eocene of the southern states he also succeeded in bringing to light similar grains of the same character by dissolving away with dilute acid the calcareous matters. One of his specimens was brought up in sinking the Artesian well at Charleston from the depth of 140 feet. The soundings of the coast survey brought up from the depths of the ocean, in the Gulf stream and the gulf of Mexico, present among other matters, some resembling greensand. Count Pourtales reports one sounding as of this character obtained in lat. 81° 32', long. 79° 35', at the depth of 150 fathoms. This, as well as the others referred to, were examined by Prof. Bailey, who found them to be greensand, and that this is often in the form of well defined casts of *polythalamia*, minute mollusks, and branching tubuli. The material he recognized to be the same as that of the fossil casts; but the chief part of the soundings he found consisted of perfectly preserved shells of the same species, which retained their brilliant colors, and gave evidence by treatment with acid that the soft parts were still present, thus proving the recent existence

of the animals. Hence it appears that in some deep seas the production of greensand is still going on, and formations of this obscure material are there growing up by the same agencies which elaborated those of ancient geological periods.

**GREENSBOROUGH**, a post village of Greene co., Ala., on the Georgia railroad, 18 m. E. from Eutaw; pop. in 1853, about 2,500. It is surrounded by large cotton plantations, and has a flourishing trade. It contains a court house, gaol, several schools and academies, a female college under the charge of the Presbyterians, and in 1850 had 3 churches, 2 banks, and one or two newspaper offices.

**GREENSTONE**, a trappean rock of granular texture, either crystalline or compact, composed of hornblende and feldspar, or augite with either feldspar or oligoclase. Its greenish color is chiefly derived from that of a silicious base of variable and indefinite composition. It is called trap when in columnar form. Basalt is essentially the same rock. Being of irregular fracture, too hard to cut, and lacking uniform grain, it is unfit for use in building except of rough walls. (See **BASALT**, and **TRAP**.)

**GREENUP**, a N. E. co. of Ky., bordering on the Ohio river; area, 480 sq. m.; pop. in 1850, 9,654, of whom 606 were slaves. It is hilly and well timbered, has a fertile soil, and abounds in coal and iron. The productions in 1850 were 5,513 bushels of wheat, 89,630 of oats, 323,488 of Indian corn, and 10,491 lbs. of wool. There were 5 grist mills, 8 saw mills, 15 churches, and 694 pupils attending public schools. Value of real estate in 1855, \$1,593,717. The county was formed in 1803, and named in honor of Christopher Greenup, governor of Kentucky from 1804 to 1808. Capital, Greenupsburg.

**GREENVILLE**, a N. W. district of S. Carolina, bordering on N. Carolina, and bounded W. by Saluda river; area, about 800 sq. m.; pop. in 1850, 20,156, of whom 6,691 were slaves; white pop. in 1859, 16,842. The Blue Ridge touches the N. border, and the rest of the surface is pleasantly diversified. The soil is generally fertile. The productions in 1850 were 637,784 bushels of Indian corn, 60,682 of wheat, 108,574 of oats, 79,731 of sweet potatoes, 15,782 lbs. of rice, and 2,452 bales of cotton. There were 5 cotton factories, 17 grist mills, 7 saw mills, 47 churches, 2 newspaper offices, and 960 pupils attending public schools.—**GREENVILLE**, the capital, and the W. terminus of the Greenville and Columbia railroad, is a favorite summer resort, and contains several churches and academies; pop. in 1850, 1,305.

**GREENWICH**, a parliamentary borough and town of England, co. of Kent, on the right bank of the Thames, 5 m. E. by S. of London, with which it is connected by railway and steamers; pop. in 1851, of the borough, 105,784, and of the town, 34,801. It stands mostly on low, marshy ground. There are numerous churches, chapels, schools, and charitable institutions. But the great objects of attraction are its hospital for

superannuated and disabled seamen, and its observatory, whence longitude is generally reckoned. The hospital, first opened in 1705, occupies the site of an ancient royal palace called Greenwich house, Placentia, or "the Pleasance," a favorite residence of several sovereigns, and the birthplace of Henry VIII. and Queen Elizabeth. It consists of quadrangular buildings, enclosing a square, and each bearing the name of the sovereign in whose reign it was erected. The N. W. quadrangle contains the apartments of the governor and the libraries of the officers and pensioners. The N. E. quadrangle is inhabited by the officers and men. In the S. W. building is the painted hall, a noble apartment, adorned with the portraits of British naval heroes and representations of naval victories. In the S. E. division is the chapel, the interior of which is richly decorated. This institution generally supports about 3,000 pensioners, and from 5,000 to 6,000 out-pensioners. The in-pensioners are amply supplied with food, well and uniformly clothed, comfortably lodged, and allowed one shilling a week each for tobacco. The out-pensioners receive each an annual stipend which averages about £12. There is an infirmary connected with the hospital, and a school for the children of decayed non-commissioned officers, seamen, and marines, which is attended by 800 scholars. The governorship of the hospital is usually held by some veteran naval commander. The observatory was erected by Charles II. for the advancement of navigation and nautical astronomy. Its organization is very complete. It is charged with the transmission of time throughout England by means of electro-magnetic circuits, in addition to its ordinary functions. Greenwich has several large factories, extensive engineering establishments, iron steamboat yards, ropewalks, &c. The borough, which comprises Greenwich, Deptford, and Woolwich, sends 2 members to parliament.

**GREENWICH**, a post township of Fairfield co., Conn., on Long Island sound, 31 m. N. E. from New York; and 76 m. S. W. from Hartford; pop. in 1850, 5,086. The New York and New Haven railroad passes through it, since the opening of which the town has become a favorite place of residence for New York merchants. It contains 8 villages, one of which bears the same name, and in 1850 had 8 churches, an iron foundry, a tool factory, and a wire factory. Putnam's hill, famous as the precipice down which Gen. Putnam galloped in his perilous escape from the British, is in this township.

**GREENWOOD**, FRANCIS WILLIAM PRIT, D.D., an American clergyman, born in Boston, Feb. 5, 1797, died in that city, Aug. 2, 1848. He was graduated at Harvard college in 1814, and immediately commenced the study of theology under the direction of Dr. Ware, the Hollis professor, approving in the main, then and for the rest of his life, the views which were so prevalent in his native city under the name of liberal Christianity. He had indeed received his



religious education under the ministry at King's chapel of the venerable man with whom he was afterward to serve as colleague, and who, by the consent and coöperation of his society, had revised the "Book of Common Prayer" there in use so as to exclude the recognition of the Trinity. In Oct. 1818, he was invited to the pastorate of the new South church and society in Boston, where the previous ministries of President Kirkland and the Rev. S. C. Thacher had drawn together a remarkable congregation of cultivated and prominent persons. After a single year of his ministry his course was arrested by a pulmonary disease. The sympathy of his friends provided him with the means for foreign travel in the hope of a restoration of his health. He passed the winter of 1820-'21 in Devonshire, England; but not gaining the strength which he needed, he wrote home to effect a complete severance of his connection with his society. He returned in the autumn of 1821. He passed a little more than two years at Baltimore, with some improvement in his health, enabling him to preach occasionally for the Rev. Jared Sparks, the minister of the Unitarian church, and to write for and to edit for nearly two years a periodical called the "Unitarian Miscellany." He married Miss Maria Goodwin of Baltimore. In 1824 he accepted an invitation from the society at King's chapel to become colleague with their pastor, Dr. James Freeman. Bodily infirmities compelled Dr. Freeman to give up all responsibility for the pulpit in 1827, and Mr. Greenwood, with occasional interruptions caused by his own slenderness of constitution, discharged all official duties. He had a strong and cultivated taste for the natural sciences, conchology and botany being his especial favorites, and he was one of the first members of the Boston society of natural history. A return of hæmorrhage at the lungs compelled him to make a voyage to Cuba in 1837. While confined to a sick chamber the year before his death, he prepared for publication a volume entitled "Sermons of Consolation" (1842). Others of his publications may be found in the "Christian Disciple," the "Unitarian Miscellany," the "Christian Examiner," the Boston "Journal of Natural History," and the "North American Review." Some sermons and essays from his pen appeared singly. Beside these, he was the author of the following: "History of King's Chapel" (12mo., Boston, 1838); "Lives of the Twelve Apostles" (1838); and "Sermons to Children." After his decease his friend and parishioner, the Hon. Samuel A. Eliot, edited two volumes of his sermons from the MSS., and prefaced them with a memoir of the author; and a volume of his miscellaneous writings was published by his son (12mo., Boston, 1846).

GREENWOOD, MILES, an American manufacturer, born in Jersey City, N. J., March 19, 1807. He removed to the West with his father in 1817, and settled near Cincinnati. In 1832 he commenced on the Miami canal, in what was

then the outskirts of the city, though now near its centre, the Eagle iron works, at first a small establishment, but which speedily became the largest manufactory of the West, covering several acres of ground, and employing more than 500 hands. In 1846 a destructive fire swept away the results of 18 years' labor, but in the course of a few months the factory was once more in operation on a more extensive plan and stronger footing than ever. Steam engines, iron buildings, stoves, iron furniture, ornamental castings, and a countless variety of small articles, are made there. Butt hinges, always before imported from England, were first successfully made in the United States by Mr. Greenwood. The establishment annually consumes 6,000 tons of iron ore. Mr. Greenwood was one of the originators of the Ohio mechanics' institute, contributed largely to the erection of their present building, and was mainly instrumental in organizing the paid fire department of Cincinnati and introducing steam fire engines.

GRÉGOIRE, HENRI, a French ecclesiastic and politician, born in Vébo, near Lunéville, Dec. 4, 1750, died in Paris, April 28, 1831. He commenced active life as a parish priest, but being nominated by the clergy of Lorraine in 1789 to represent them in the states-general, he at once took ground as a republican, and was one of the first of the clergy to take the oath of fidelity to the constitution. He voted against primogeniture and special privileges, and zealously advocated the admission of Jews and men of color to full rights of citizenship. Under the new constitution of the clergy the department of Loir-et-Cher in 1792 elected him bishop, on which he assumed, from the seat of the episcopate, the appellation of bishop of Blois. In the convention he led the movement for the abolition of the regal office, and made a bitter speech against kings in general, ending by demanding that Louis Capet should be brought to trial. One maxim of his became a watchword of the revolution: *L'histoire des rois est le martyrologe des nations*. His oration caused him to be made, the same day, president of the convention, and he boasted in his memoirs that he presided in his episcopal gown. Grégoire was absent with three other delegates revolutionizing Savoy when the king was brought to trial, but with his colleagues he wrote from Chambéry to the convention: "We declare that our vote is for the condemnation of Louis Capet by the convention, without appeal to the people." He afterward took pains to make it appear that he did not express the wish that the king should be condemned to death, but that he should be "condemned to live." Further, he says he endeavored to save the life of the king, by proposing to abolish the death penalty. Throughout all those troublous times he exhibited a marked boldness in defence of religion. When Gobel, the archbishop of Paris, assented to the worship of Reason, Grégoire boldly declared to the commune: "Oatholic by conviction and sentiment, and priest by choice, I have been

elected by the people to be bishop, but it is neither from them nor you that I hold my mission!" He contributed zealously to preserve the monuments of art, and also extended his protection to men of letters and artists. In 1800 he entered the legislative body, and having been transferred in 1801 to the senate, formed one of the minority of 5 opposed to the accession of the first consul to the throne. He alone opposed the reestablishment of titles of nobility, although Napoleon, unwillingly, on the request of both houses of the legislature, afterward made him a count of the empire and officer of the legion of honor. He was equally opposed to the emperor's divorce, and declined to be present at the marriage with Maria Louisa. On Napoleon's first reverses, in 1814, Grégoire pronounced against him an oration more vehement than that which he had spoken against Louis XVI. He was not comprised in the chamber of peers formed by the Bourbons in 1814, nor in Napoleon's chamber in the Hundred Days. On the 2d restoration he was excluded from the institute, was deprived of his bishopric, and was compelled by the stoppage of his pension to sell his library for the means of support. He retired to Auteuil, where he passed the last 15 years of his life in literary labors. The excitement of the revolution of 1830 hastened his death. He never departed from the stand he had taken in sustaining the order of things established by the constituent assembly over the affairs of the church. The last offices of religion were denied him on his death-bed by his ecclesiastical superiors, in consequence of his refusal to retract the oath he had taken to the assembly; but the civil power having interfered, funeral rites were performed over his body in the church of l'Abbaye aux Bois by a proscribed priest. The people took his corpse in charge on emerging from the church, and, removing the horses from the hearse, drew it in solemn procession to the cemetery of Mont Parnasse. Bernardin de l'Oise describes Grégoire's character in saying that he wished to "Christianize the revolution." The most important of his numerous publications are his *Histoire des sectes religieuses* (2 vols. 8vo., 1810); *Essai historique sur les libertés de l'église Gallicane* (1818); *De l'influence du Christianisme sur la condition des femmes* (1821); *Histoire des confesseurs des empereurs, des rois, et d'autres princes* (1824); *Histoire du mariage des prêtres en France* (1826). He also wrote a work entitled *De la littérature des Nègres*, containing sketches of the lives and writings of negroes "who have distinguished themselves in science, literature, and the arts," the object of which was to demonstrate the moral and intellectual capabilities of the African race. This work has been translated into English, and published both in Great Britain and the United States. His *Mémoires*, with a notice of the author by M. Carnot, were published in 1837.

GREGORIAN CHANT, a method of singing

the psalms and litanies of the church introduced by Pope Gregory the Great about 590. It was mainly founded on the Ambrosian chant, previously in use in the western churches, to the 4 authentic or principal modes of which Gregory, either for variety or convenience of the voice, added the plagal or collateral modes. His additional object in effecting this reform was to banish from the church all rhythmic singing, as too lively for the place and occasion, and to substitute in his own chant, which was called the *canto fermo*, a gravity and simplicity suited to the solemn offices of the church. He also established in Rome a school of instruction in the new method of singing, which existed for 8 centuries after his death. Notwithstanding the monotony of the Gregorian chant, its extreme simplicity and dissimilitude to secular music, or even to that at present employed in the services of the church, it is still in use, and during Lent and on other special occasions may be heard in all its ancient glory in Roman Catholic churches, and to a limited extent in those of other denominations. To the student of ancient music it is valuable as retaining some of the old Greek modes, which, according to Rousseau, "have still a beauty of character and a variety of expression which intelligent hearers, free from prejudice, will discover, though formed upon a system different from that in present use." It has been supposed that fragments of the melodies sung in the celebration of the Eleusinian mysteries are discernible in the Gregorian chant.

GREGORIO, ROSARIO, a Sicilian archæologist, born in Palermo in 1753, died there in 1809. In 1789 he was appointed professor of law in the university of Palermo, but only accepted the office after 5 years' preparatory study of its duties. About this time appeared Vella's remarkable literary forgeries, purporting to be valuable Arabic documents relating partly to the history of Sicily and of Egypt, discovered by him in a mosque during his travels in the East. Gregorio, having doubts of their authenticity, made himself master of the Arabic language with the view of investigating them. His researches proved them to be spurious. In 1790 he published in Latin and Arabic the materials he had himself collected illustrative of the Saracenic rule in Sicily, and afterward a continuation of its history under the Aragonese sway. His principal work, in which he has embodied the substance of all his others, is *Considerazioni sulla storia di Sicilia, dei tempi Normanni sino ai presenti* (7 vols. 8vo., 1806-'16).

GREGORY, the name of 16 popes. I. A saint and doctor of the church, surnamed the Great, born of a noble family in Rome about 540, died March 12, 604. His parents were wealthy, but noted for their piety, his father Gordianus having renounced the world, and died a *regionarius*, that is, one of the 7 cardinal deacons who took care of the districts of Rome. His mother Sylvia also devoted herself to an ascetic life in an oratory near St. Paul's. Gregory

became distinguished not only for his literary attainments, but also for his knowledge of philosophy, civil law, and the canons of the church. In 574 the emperor Justin the Younger appointed him prætor or governor of Rome. He built 6 monasteries in Sicily out of his estates in that island, and turned his own house on the Cælian hill in Rome into a religious asylum. This last institution still exists, and is known as San Gregorio in Monte Cælio, and is held by a community of monks of the order of Camaldoli. Gregory here took the habit of a monk himself in 575. Paul the Deacon testifies that at this early period he began to work for the conversion to Christianity of the English nation, some English youths having by their great comeliness attracted his attention to them in the market place where they were exposed for sale as slaves. "They would deserve to be called not Angles, but angels," sighed the good monk, "if they were only Christians" (*Non Angli sed angeli si forent Christiani*). He obtained private leave from Pope Benedict I. to go and preach the gospel in Britain, and even started on his journey thither, but was recalled on account of the clamors of the people, who would not consent to his departure. Pelagius II. drew Gregory from his retreat, making him one of 7 deacons of Rome, and afterward nuncio to Constantinople, where he was most favorably received by the emperor. While in Constantinople he reclaimed the patriarch Eutychius, who taught that our bodies after the resurrection will not be palpable, but of a subtler texture than air. Pope Pelagius recalled Gregory in 584, and dying in 590 was succeeded by the latter, who with great reluctance ascended the papal chair. He governed the church for more than 13 years. He had some trouble with Romanus, exarch of Ravenna, with the Lombards, who then overran the peninsula, and with the tyrannical emperor Mauritius. He arrested the progress of Arianism in Spain, corrected many scandals in Gaul, and sent to England Augustin and his companions, by whom that island was converted to the faith. The patriarch of Constantinople, John, surnamed the Faster, having adopted the title of œcumenical patriarch, Gregory condemned his assumption, and as an example of humility styled himself *servus servorum Dei*, the servant of the servants of God. He has left more works than any other of the long line of Roman pontiffs. His chief writings are: *Libri Moralium*, 85 books, mainly a commentary on the book of Job; 40 homilies on Ezekiel; *Liber Regula Pastoralis*, in 8 parts; 4 books of dialogues, and 14 books of letters. A life of St. Gregory was written by Paul the Deacon, and another by John the Deacon. The best edition of his works is the Benedictine (4 vols. fol., Paris, 1705). The duke de Luyne and the abbé Prévost have published French translations of some of his works, and Gondrin, archbishop of Sens, a selection from his letters in the same language. II. A saint of the Roman Catholic church, born in Rome, elected pope

May 11, 715, died in 731. He reestablished the monastery of Monte Casino, and held two councils; during his pontificate St. Boniface went to preach in Germany. It is alleged by many writers that the temporal power of the papacy had its origin at this epoch. Tired of the exactions of the emperor Leo the Isaurian, the Romans, it is stated, refused to submit any longer, and the Roman senate offered the government of the city, which was then threatened with invasion by the Lombards, to Gregory, who consented finally to accept it. There are several letters of this pope in Labbe's collection of the councils. III. Born in Syria, succeeded Gregory II. in 781, died in 741. He wrote to the emperor Leo, reproaching him for upholding the iconoclasts; but finding that prince incorrigible, he assembled a council in 782, excommunicating the iconoclasts as heretics. The Lombards annoyed him as they had done his predecessor, and in the hope of obtaining the aid of Charles Martel against these troublesome neighbors he sent an embassy to France. The application proved however fruitless. Gregory was the first pope who ruled the exarchate of Ravenna in a temporal sense, not in virtue of any formal donation, but because, abandoned by the Greeks, the citizens saw no one to whom they could appeal for protection but the bishop of Rome. IV. Born in Rome, made pope in 827, died in 844. He rebuilt the city of Ostia, to defend the mouth of the Tiber against the inroads of the Mussulmans who had taken possession of Sicily. He undertook a journey to France in the hope of arranging the dissensions between Louis le Débonnaire and his sons, but failed in the attempt, and returned to Rome disgusted with both parties. V. A Saxon named BARN, nephew of the emperor Otho, elected pope in May, 996, died in 999. His pontificate was troubled by Philogethes, bishop of Piacenza, who became antipope under the name of John XVI. The latter was sustained by Crescentius, consul of Rome, but finally driven thence by Otho and excommunicated by Gregory in the council of Pavia, 997. VI. JOHN GRATIANUS, a Roman, and archpriest of the Roman church, elected pope, some say by simoniacal means, April 8, 1045, died in 1047. He resigned at the council of Sutri in Dec. 1046, and retired to the monastery of Cluny. VII. HILDEBRAND, son of a carpenter, born in Soano, Tuscany, chosen pope in 1073, died May 24, 1085. He was educated by his uncle in a monastery on the Aventine hill at Rome. He afterward went to France, and became a monk at Cluny under the famous abbot Odilo. He was recalled to Rome and made prior of the abbey of St. Paul *extra muros*. The church lay almost in ruins, the community was small, and the greatest part of its possessions was occupied by powerful laymen. Hildebrand gave them a foretaste of the power he was subsequently destined to exercise upon a bolder and a broader scale. He soon recovered the lands, and raised the abbey of St. Paul's to more than its

pristine splendor. He was the chief adviser of Leo IX., and preserved his great influence during the short pontificates that followed his reign, but especially under Victor II. and Alexander II. Victor sent him to France in 1054 to abolish simony in the collation of ecclesiastical benefices. He accomplished this in a council held at Lyons, and presided also at the council of Tours, where Berengarius recanted his doctrines touching the subject of the eucharist. Nicholas II. and Alexander II. were elected to the papacy mainly through the influence of Hildebrand. Thus by constant employment in church affairs of the highest importance he was prepared for the pontifical dignity, to which he was exalted in 1073. He ascended the papal throne with great apparent reluctance and with professions of extreme humility. He wrote to Henry IV., emperor of Germany, who was then in Bavaria, beseeching him to have the project of his election set aside, and declaring plainly at the same time that if he were made pope he would certainly call the emperor to a severe account for the scandals and disorders of which he was known to be guilty. Henry nevertheless gave his consent to Hildebrand's election, and the latter was consecrated on St. Peter's day. Once fairly enthroned, he did not forget his determination to attack the gigantic abuses which then afflicted the church. His projects were vast, his zeal was intrepid and patient. The first evil he took in hand was that of simony. He wrote to the pious countess Beatrice and her daughter, the celebrated countess Matilda of Tuscany, telling them not to hold communion with those bishops of Lombardy who had been convicted of simoniacal crimes. He deposed Godfrey, archbishop of Milan, from his see, to which he had been elected by simoniacal means. He held a council at Rome, and enacted a decree that all persons guilty of the sin were incapable of receiving ecclesiastical jurisdiction, and disqualified to hold any benefice whatever. He also strictly enforced the observance of celibacy on the priests, a measure which encountered great opposition from the clergy, many of whom had wives. He thus made the priesthood throughout Christendom more dependent on the papacy than ever before. His determined action against simony stirred up all Germany in opposition, and brought him into direct collision with the emperor, who made no scruple of selling ecclesiastical livings when and wherever he pleased. The archbishop of Mentz came near being killed for attempting to enforce the papal enactment. In 1075 the pope excommunicated Cencius, a rich and powerful nobleman, and some other persons, for certain nefarious practices of which they had been guilty. Cencius in revenge on Christmas night, while the pope was celebrating mass in the church of St. Mary Major, rushed in upon him with several bravos and dragged him violently from the altar to the nobleman's stronghold. One of the party even made the attempt to strike off the pontiff's head, inflicting a deep wound upon his neck. The Roman

people, indignant at these outrages, scaled the tower on the following day, delivered Gregory, and banished the conspirators from the city. Some writers say that Cencius acted at the instigation of Henry IV., who was now at open war with the pope, especially on the vexed question of investitures. He went so far on finding that the pope was inflexible as to assemble at Worms in 1076 a conventicle of bishops submissive to the imperial will, and passed a sentence of deposition against Gregory. The emperor sent this decree to Rome together with an abusive epistle. Gregory in a council held at Rome excommunicated the emperor, and proclaimed that for his tyranny and wickedness he had forfeited his crown. Several princes of the empire, acting on it, chose Rudolph, duke of Swabia, emperor. Henry, alarmed by the desperate aspect of his affairs, suddenly resolved to make a personal appeal to the pope for pardon and reconciliation. He crossed the Alps in the depth of winter, and in January, 1077, presented himself almost without attendants before the pope at the castle of Canossa. The pontiff is said by some writers to have treated him with great haughtiness and severity, and kept him waiting for 3 days in the cold in an outer court of the castle, bare-footed and clothed with only a single garment. The emperor having sufficiently humbled himself, the pope at length removed the ban of excommunication. Henry, enraged at the humiliation he had experienced, and with his ideas of the papal power and character much lowered by his visit to Italy, returned to Germany and made war on his rebellious subjects, whom he defeated in several engagements, and Rudolph finally died of wounds received in battle. In 1081 Henry marched on Rome, and set up a pope of his own in the person of Guibert, the excommunicated archbishop of Ravenna, whom he called Clement III. In 1084 he renewed his attack on Rome, and compelled Gregory, who had again excommunicated the emperor, to retire to the castle of St. Angelo, where he was besieged by the imperial army, but was soon relieved by Robert Guiscard, the Norman duke of Calabria. Beatrice and the countess Matilda also defended the pope against his enemies, and the Tuscan forces gave the imperialists a severe overthrow in Lombardy. Gregory bore his reverses with meekness, and according to Anselm of Lucca, his heart seemed perfectly disengaged from all earthly things. Robert, the Norman duke, having rescued him from his adversaries, conducted him for greater security to the abbey of Monte Casino, and from thence to Salerno, where he died. His last words were: *Dilexi justitiam et odii iniquitatem, propterea morior in exilio* ("I have loved justice and hated wickedness, and therefore I die in exile"). These words may still be read upon his tomb in the church of St. Matthew at Salerno. There is a collection of highly interesting letters by Gregory VII. in the Bollandist "Lives of the Saints." See also the volume of epistles, &c., of Gregory

VII., 148th of the abbé Migne's "Patrology," and his life by the learned German Protestant Voigt. VIII. ALBERT DE MORA, succeeded Urban III., Oct. 21, 1187, died Dec. 16 of the same year. He is not to be confounded with the anti-pope Bourdin, who assumed the name of Gregory VIII. IX. HUGOLIN, succeeded Honorius III. in 1227, died in Rome, Aug. 20, 1241. He is remarkable chiefly for his controversies with Frederic II. X. TEBALDO, born of the noble Visconti family in Piacenza, died in Arezzo, Jan. 10, 1276. He became archdeacon of Liège, and rose zealously against Henry de Gueldres, prince bishop of that city, on account of his unclerical and scandalous conduct. The prelate treated him with great severity, and, after a protest before the chapter of the cathedral, the archdeacon quitted Liège and went to Palestine. While in the Holy Land with Edward of England, he was nominated to the papacy in 1271. The following year he issued letters calling a general council, naming as his reasons for the step the Greek schism, the unfavorable state of affairs in the Holy Land, and the vices and errors which were on the increase in the church. The council was held at Lyons in 1274, and one of the first scandals denounced before it was the public immorality of Henry de Gueldres, archbishop of Liège. Henry, foreseeing no chance of leniency at the hands of the council, resigned his bishopric to avoid a trial. The pope sought earnestly but in vain to rekindle the enthusiasm of Christendom in favor of the Holy Land. Gregory was the originator of the conclave, by which the election of the pope is protected from outside interference and unreasonable delay. (See CONCLAVE.) XI. PIERRE ROGER, born in the Bas Limousin in 1329, elected pope in 1370 (the last Frenchman who has occupied the pontifical chair), died March 27, 1378. To him belongs the credit of having put an end to what was called the captivity of Babylon, meaning the residence of the popes at Avignon. Yielding to the solicitations of many of the most eminent persons in Christendom, he quitted Avignon in 1377 and returned to Rome. This pope is also remarkable as the first who condemned the teachings of Wycliffe. XII. ANGELO CORARIO, born in Venice about 1325, elected pope in 1406, died in Recanati, Oct. 18, 1417. For an account of him and his times, see CONSTANCE, COUNCIL OF. XIII. HUGO BONCOMPAGNI, born in Bologna, Feb. 7, 1502, elected pope in 1572, died April 10, 1585. Distinguished as a lawyer and professor of civil and canonical jurisprudence, he appeared with success at the great council of Trent. His pontificate is remarkable as the epoch of the reformation of the calendar. (See CALENDAR.) The *Decretum Gratiani* (see CANON LAW) was also published by him in splendid style, and with copious notes, some of which were from the pope's own hand. The end of his pontificate was signalized by the appearance in Rome of an imposing embassy from Japan, sent by some of the princes who had been re-

cently converted to the Christian faith. XIV. NICOLO SPONDRATI, born in Cremona, elected pope in 1590, died in 1591. XV. ALESSANDRO LUDOVISIO, born in Bologna in 1554, elected pope in 1621, died in 1623. He founded the celebrated congregation *de propaganda fide*, a sort of foreign office for the disposing and arranging of ecclesiastical affairs of all missionary countries throughout the world. He canonized 4 celebrated saints of the Catholic church, Ignatius Loyola, Francis Xavier, Philip Yeri, and Teresa. He enacted that for the future the balloting for the election of a new pope should be done secretly. XVI. MAURO CAPPILLI, born in Belluno, Sept. 18, 1765, died in Rome, June 1, 1846. He entered in his youth the order of Camaldolese monks. In 1799 he published a theological treatise entitled "The Triumph of the Holy See, or the Innovators defeated with their own Weapons," a work directed chiefly against the views of the Jansenists, and especially against Tamburini. He was elected in 1807 vice procurator-general of his order, and abbot of San Gregorio in Rome. Leo XII. made him a cardinal in 1826. He was elected to the pontifical chair, Feb. 2, 1831, and governed the church for 15 years. His reign was troubled from the very beginning by insurrectionary movements, started chiefly through the agency of secret political associations. The fiercest of these movements took place at the very dawn of his pontificate, and cannot be considered as expressive of any dislike for the person of the pontiff, whatever reflections it may give rise to touching the system of the temporal papal government. Gregory's advisers were sternly conservative, and had recourse more than once to Austrian intervention for the repression of disturbances in the States of the Church. He condemned the innovations attempted by Hermes in theology, and by Lamennais in politics. He maintained a long discussion with the government of Prussia on the subject of mixed marriages, during the course of which the archbishop of Cologne was imprisoned for non-conformity with the views of the government. On his liberation and arrival at Rome, Gregory made him a cardinal. Gregory was visited in the Vatican by the czar Nicholas of Russia. He reproached that sovereign so as to move him even to tears. The pope complained of certain grievances of the Catholic subjects of the czar, and it is to the credit of both potentates to record that these grievances were in several instances modified, and in some entirely removed.

GREGORY, JAMES, a Scottish astronomer and mathematician, born at Drumoak, Aberdeenshire, in 1688, died in Edinburgh in Oct. 1675. He was educated at Marischal college, Aberdeen, and at the age of 24 published his *Optica Promota* (London, 1668), a work said to have formed an era in the history of science in the 17th century, and in which he describes the reflecting telescope invented by him and bearing his name. This instrument has never been superseded for

general astronomical purposes, although the reflecting telescope of Sir Isaac Newton is employed in more extended fields of observation. In the same work he also pointed out the method of employing the transits of Mercury and Venus to determine the sun's parallax. In 1667 he repaired to the university of Padua, and soon after published a treatise on the quadrature of the circle and hyperbola by means of a converging series, which involved him in a warm dispute with Huyghens, who alleged that the system contained serious errors. Leibnitz, in reviewing the subject, concluded that although Huyghens had detected no errors in Gregory's work, he had nevertheless arrived at some of his results by a simpler process. Returning to Scotland about 1668, he was soon after chosen professor of mathematics at St. Andrew's. In 1674 he accepted the same chair in Edinburgh, and a year later was struck with a sudden blindness, and died a few days afterward. He was the inventor of the concave burning mirror, of methods for squaring curves and making logarithms by an infinitely converging series, and of a variety of other ingenious mathematical and geometrical processes. It is said that, owing to the want of skill of the London instrument makers, he never had an opportunity of seeing one of his telescopes completed.—DAVID, nephew of the preceding, born in Aberdeen, June 24, 1661, died Oct. 10, 1708. He was educated at the university of Edinburgh, where he was instrumental in introducing the Newtonian philosophy, and in 1684 published a Latin treatise on the dimensions of figures, entitled *Exercitatio Geometrica*, which is esteemed his best work. In 1691, chiefly through the influence of Flamsteed and Sir Isaac Newton, he was appointed Savilian professor of astronomy at Oxford, the celebrated Dr. Halley being his competitor. In 1703 appeared his "*Astronomia Physica et Geometrica Elementa*," an important work, giving a sort of digest of Newton's *Principia*, and which Newton himself highly commended; and in 1708 he published an edition of Euclid in Greek and Latin. He was engaged at the time of his death upon an edition of Apollonius, which was completed by Halley. Such was the estimation in which Newton held Gregory that he intrusted him with a manuscript copy of his *Principia*, and in a 2d edition availed himself of his friend's marginal comments.—JOHN, grandson of James Gregory, born in Aberdeen, June 8, 1734, died in Edinburgh, Feb. 10, 1773. He was educated at the university of Aberdeen, from which he received the degree of M.D., and where he filled the chair of medicine from 1756 to 1764, when he removed to Edinburgh. In 1766 he was chosen to succeed Dr. Rutherford as professor of the practice of physic in the university of Edinburgh, a position which he filled until his death. His principal works are: "*Elements of the Practice of Physic*" (8vo., Edinburgh, 1772), which was left unfinished, and "*A Father's Legacy to his Daughters*" (posthumous, 12mo., 1774).—JAMES, son of the

preceding, a physician, born in Aberdeen in 1758, died in Edinburgh, April 2, 1821. At the age of 28 he was appointed professor of the theory of physic in the university of Edinburgh, and in 1780 published as a text book for his classes his *Conspexus Medicinæ Theoreticæ*. In 1790 he succeeded Dr. Cullen in the professorship of the practice of medicine, which he filled until his death.

GREGORY, OLINTHUS GILBERT, an English mathematician and author, born in Yaxley, Huntingdonshire, Jan. 29, 1774, died in Woolwich, Feb. 2, 1841. Shortly after leaving school he wrote a treatise on the "Use of the Sliding Rule," which led to a correspondence between him and Dr. Hutton, who became his friend. In 1798 he removed to Cambridge, where he published in 1800 his "Treatise on Astronomy," and two years after undertook, in connection with Dr. John Mason Good, the editorship of the "Pantologia," a cyclopædia of the arts and sciences. He was also appointed, through the influence of Dr. Hutton, a mathematical master at the royal military academy at Woolwich, and on the resignation of his friend in 1806 he was raised to the professor's chair in that institution. This office he held till June, 1838. His principal works are a "Treatise on Astronomy," a "Treatise on Mechanics," the "Evidences of Christianity," and "Memoirs" of the Rev. Robert Hall and Dr. John Mason Good.

GREGORY OF NYSSA, a saint and father of the church, born at Sebastos about 381, died about 400. He was a younger brother of St. Basil the Great. He was educated in sacred and polite learning, married a virtuous lady, afterward renounced the world, and was ordained lector; but his passion for literature led him to give himself up again to its pursuit, and he became celebrated as a teacher of eloquence. St. Gregory Nazianzen wrote him a letter exhorting him to renounce the "inglorious glory" of mere worldly renown, and dedicate his talents to the ministry. He complied with this advice, and became assistant to St. Basil in his pastoral duties, and in 379 was chosen bishop of Nyssa. A question whether he lived with his wife after his episcopal consecration or not has been proposed by the distinguished Anglican Dr. Cave. In reply to his affirmation is quoted St. Jerome, who shows that the custom of the eastern churches would not have tolerated such a thing, and a eulogy upon the lady's memory by St. Gregory Nazianzen, who says that she rivalled her brothers in sanctity, and that she was sacred or consecrated to God, leading a life of continency, and being, it is likely, a deaconess. Gregory was banished from his see under Valens, through the influence of the Arians, but restored to it on the accession of Gratian. He assisted at the council of Constantinople in 381. His works were collected and published by the learned Jesuit Fronton du Duc (2 vols. fol., Paris, 1615). Claude Morel added a 3d volume in 1688.

GREGORY OF TOURS, a bishop and saint of

the church, and the oldest writer of the annals of France, called the father of French history, born in Auvergne in 539, died probably Nov. 17, 596. Having contracted a dangerous distemper, he made a pilgrimage to the tomb of St. Martin at Tours, and thus became known to the people of that city. The bishop, St. Euphronius, having died shortly after the departure of Gregory, both clergy and people demanded him for their pastor. He was consecrated by Giles, bishop of Rheims, Aug. 23, 578. He controverted the views of the Arians and the Sabelians, and brought numbers of them back to the ancient faith, as much by his example and mildness as by his arguments. In 594 he paid a visit to Rome, and was most kindly received by Pope Gregory the Great. He ordered his body to be buried without any sign of distinction, where all might walk over his grave as they came to the church. For a full account of the works of Gregory and their various editions, with critical remarks, &c., see Dom Rivet, *Histoire littéraire de la France*. A translation of his "Annals" has been recently made by M. Guizot (2 vols. 8vo., Paris, 1859).

GREGORY THE ILLUMINATOR (ՄԱՐԿՐ ՆՈՒՅԱՅՈՐԴՈՐ), a saint of the church, the apostle and first patriarch of Armenia, born in Vagharshabad in 257, died about 332. He was the son of Anag, a prince of the royal family of Arsacidae, who having assassinated Osroes I., king of Armenia, was put to death with all his family except Gregory, who was then 2 years old. Gregory was taken to Cæsarea in Cappadocia by a Christian nurse, and on becoming of age was there married to a lady of the same faith, from whom he separated 8 years later by mutual consent, in order to embrace an ecclesiastical life. He went to Rome, and without disclosing his religion or parentage attached himself to the suite of Tiridates II., king of Armenia, who was then in that city, and accompanied him to Armenia, where, having refused to sacrifice to idols, he was subjected to various tortures, and finally cast into a dungeon near Artaxata. A benevolent widow supported him here for 14 years, at the end of which time the king, having been cured by his prayers of a desperate malady, embraced the faith (302). The saint afterward went to Cæsarea, and was consecrated metropolitan of Armenia. Returning to that country, he preached the gospel both E. and W. of the Euphrates, baptized many, destroyed pagan temples, built churches, ordained priests and having converted most of the nation, consecrated his son Arisdages as his successor in 318, and withdrew to a cave in upper Armenia, where he passed the rest of his life in contemplation. There are several homilies in Armenian which bear this saint's name, but they are probably not authentic.

GREGORY NAZIANZEN, a saint and doctor of the church, born about 314, died about 389. His father Gregory, a convert from heathenism, was on account of his holy life and great zeal made bishop of Nazianzus, which see he governed 45 years, and died when about 90

years old. Gregory the father and Nonna the mother of the saint are recognized as saints in the calendars of the church. The son was carefully educated in the schools successively of Cæsarea, Alexandria, and Athens. In the last city he made the acquaintance of two fellow students, both destined to become celebrated, one as the great St. Basil, the other as the emperor Julian the Apostate. Having completed his studies, he went to Nazianzus, and there received baptism at the hands of his father. He then gave himself up to a life of the strictest self-denial, mortification, and prayer. He even withdrew into the desert and lived as a hermit in company with St. Basil near the river Iris in Pontus, devoting the whole of his time to religious exercises, manual labor, and study. Returning to Nazianzus at the request of his father, who desired his assistance in the government of his diocese, he was about Christmas, 361, ordained priest. He fled again for a time to the desert, but fearing to incur the displeasure of heaven by shrinking from his work, he returned to Nazianzus, and on Easter Sunday preached his first sermon. He is considered by many as the most eloquent of all the fathers of the church. His addresses are fervid, redundant in ornament, and distinguished by the play of the imagination, for Gregory was a poet, and wrote much in verse as well as in prose. Among his early addresses were two of great severity against the emperor Julian. In 372 he was consecrated bishop by St. Basil, then metropolitan of Cappadocia. The see for which he was destined was Sasima, but being prevented from occupying it, he remained to help his father in the administration of Nazianzus. In 378 the death of the emperor Valens restored peace to the church, and the pastors everywhere sought to restore to their churches some of their pristine glory, obscured by 40 years of Arian domination. Some of the principal sees were in a deplorable condition, and in Constantinople especially the Christians were without a pastor, or even a place where they might assemble for worship. Gregory was living in retirement at Seleucia, but many of the bishops desired to place him in the episcopal chair of Constantinople. He finally yielded to their joint entreaties, and appeared upon his new field of labor. His lowly and penitential exterior made an unfavorable impression upon the citizens of the proud and wealthy capital of the East. The Arians and Apollinarians derided, and even pelted him with stones. Still the great patience and zeal of the bishop began to act favorably upon the people, aided, it has been avowed, by several miracles. Many were converted from paganism, heresy, and dissolute lives through the instrumentality of his eloquence and learning. Gregory, however, soon became weary of the growing cares of his great see; and although the emperor Theodosius and Pope Damasus and the bishops supported him against his persecutors, especially against an intruded bishop named Maximus, and al-

though even a council called at Constantinople declared him patriarch, he insisted upon resigning all his honors, and retired again to Nazianzus, and withdrew from thence to a solitary abode near Arianzus. Worn out by age and unremitting austerities, he died in his retreat. The Latins honor him on May 9. His ashes were conveyed from Nazianzus to Constantinople, and from thence during the crusades to Rome, where they repose under an altar inscribed to his memory in the Vatican church. The works of this father consist chiefly of 55 sermons, 285 letters, and 158 pieces of poetry. Twenty poems are to be found in Tollini, *Insignia Itinerarii Italici* (4to., Utrecht, 1696), called by the editor *Carmina Cygnea*. Muratori published 228 unedited epigrams of Gregory's in his *Anecdota Græca* (Padua, 1709). An edition of his works appeared at Basel in 1550, and again at Paris (3 vols. fol., 1609-'11), with notes by the abbé de Billy, an eminent Greek scholar. Dom Maran of the Benedictine congregation of St. Maur undertook another edition, of which the first volume appeared in Paris in 1788, in folio. Half a century later Dom A. B. Caillaud added another volume (fol., Paris, 1840), inferior in merit to the first. Hermant published a careful life of St. Gregory (4to., Paris, 1875).

GREGORY THAUMATURGUS (the wonder worker), a saint of the church, born in Neocæsarea, died probably about 270. In his youth he was a disciple of Origen. He was elevated to the bishopric of Neocæsarea about 240, and endeavored to avoid the episcopate, but finally consented to receive it. St. Basil, St. Maximus, and other fathers speak of him as a second Moses or Paul, and represent his episcopate as marked by a series of miracles wrought through his intercession. They describe him as being master of the powers of nature and of the hearts of men. A mountain hindering the erection of a church, he is said to have appealed to the divine promise: "If ye have faith, ye shall say to this mountain, Remove hence, and it shall remove," and successfully commanded the mountain to move. He miraculously dried up a marsh which was the cause of discord between brothers; and during an inundation of the river Lycus he planted his staff on the bank upon which he stood; the staff grew into a flourishing tree, and remained as a mark beyond which the waters flowed no more. He cast out devils from idols and the bodies of men possessed, and was gifted with the spirit of prophecy. He drew innumerable men to the faith, and performed many other signs and wonders. When about to die, he asked how many heathens there were in the city of Neocæsarea, and was answered 17. Giving thanks to God, he said: "There was that number of Christians in it when I was made bishop." His works were published by Vossius (1 vol. 4to., Mentz, 1604), and in Latin and Greek (fol., Paris, 1622), with a life of the author and copious notes.

GREIFSWALDE, a circle of the Prussian district of Stralsund, in Pomerania, pop. 48,500, and

its capital of the same name, pop. 13,470. The town stands on the Ryck, 8 m. from the sea, and 20 m. S. E. from Stralsund. It was once a place of considerable strength, and is still surrounded by a wall which has been converted into a promenade. It contains a university, attended by about 200 students, which celebrated its 400th anniversary Oct. 17 and 18, 1856. There are manufactories of pins, soap, candles, tobacco, and leather.

GRELLET, STEPHEN, a Quaker missionary, born in France in 1773, died in Burlington, N. J., Nov. 16, 1855. He was originally a Catholic, and was educated at the military college of Lyons. At the age of 17 years he entered the body guard of Louis XVI. After the execution of that monarch, he escaped to Demerara, and in 1795 he proceeded to New York, where, chancing to attend a Quaker meeting, he was so attracted by the primitive, simple demeanor and doctrines of the Friends, that he determined to join their society. In the following winter he removed to Philadelphia, and during the prevalence of the yellow fever in that city in 1798 he ministered to the sick, the dying, and the afflicted. In 1799 he removed to New York and engaged in mercantile business. He now became impressed with the conviction that it was his duty to go forth as a missionary and preach the gospel. In this capacity he made a tour into several of the southern states in 1800, and in the next year into New England and Canada. In 1807 he visited the south of France with this philanthropic object, and in 1812 he travelled in England and Germany for the same purpose. In 1816 he preached to the inhabitants of Hayti, and in 1818 and the two following years he travelled through Norway, Sweden, Russia, Greece, and Italy, preaching before the pope, and having an audience of the czar. In 1834 he closed his missionary labors and retired to Burlington.

GRENADA, a British colony and island in the West Indies, the most southerly of what are called the Caribbee islands, situated between lat. 11° 58' and 12° 20' N., and long. 61° 20' and 61° 35' W., about 60 m. from the nearest part of South America; length from N. to S. about 25 m., greatest breadth 12 m.; area, about 180 sq. m.; pop. in 1856, including the Grenadines, 32,705, about  $\frac{1}{4}$  of whom are whites; of the colored population, 2,425 were natives of Africa. A range of mountains, whose highest peak, Mt. St. Catharine, is 3,200 feet above the sea, traverses the whole length of the island, and sends off lateral spurs of less elevation. Numerous small rivers rise in these mountains, the principal of which are Great Bucclet, Duguesne, Antoine, St. John's, and Bean Séjour. In the centre of the island, and 1,700 feet above the sea, is a circular lake  $2\frac{1}{2}$  m. in circumference. The island is divided into 6 districts called parishes, and in 1856 contained 29 schools attended by 1,505 pupils. The capital, St. George (pop. 4,567), is situated on the W. coast, near a large and strongly fortified bay, which is capable of



giving shelter to a large fleet of first class vessels. It is nearly landlocked, and steamers of 1,800 tons can lie alongside the wharves. This port is a coal depot and central station for the British West India mail steamers. Grenada is governed by a lieutenant-governor, a council of 12 members, and a legislative assembly of 26. The revenue in 1856 was £16,890, the expenditure £15,458. The expenses of the military and civil departments, which are defrayed by Great Britain, amounted to £14,391. The imports in 1856 were in value £78,818, and the exports £105,458. Entrances of vessels 306, tonnage 11,550; clearances 349, tonnage 13,008. The staple products of the island are sugar, rum, molasses, and cocoa of a superior quality. Among the minor articles of export are yams, charcoal, and arrow-root. The Grenadines are 4 small islands in the vicinity of Grenada, the largest of which, Carriacou, is 7 m. long and 2½ m. broad. Grenada was discovered by Columbus in 1498, and was at that time peopled by the fierce and warlike Caribs. In 1650 the first European settlement was made by Du Parquet, the French governor of Martinique, who landed with 200 followers, and speedily conquered the island, and massacred its native population. In 1762 it was conquered by the British, from whom it was reconquered by the French in 1779, and by them restored to Great Britain at the peace of 1783. Slavery was abolished in 1838, at which time the slaves numbered 17,190, and the free population 8,804, most of whom were colored.

**GRENADE**, in artillery, an iron shell of about 2½ inches diameter and nearly 2 lbs. weight, filled with gunpowder and furnished with a fuse which is lighted as the ball is thrown by the hand. It was introduced in warfare in 1594, and was chiefly employed to throw from parapets upon the besiegers below. It has also been much used in naval service in close action.

**GRENADIER**, one of a company of picked men attached to most European regiments, and distinguished by their height and fine personal appearance. They originally wore a large cap and other peculiar articles of dress, and were selected to lead in attack. The term originated in France, where it was applied in 1667 to the *enfants perdus*, who were armed with hand grenades, and distributed among the infantry, 4 being at first assigned to each company. Beside their bodily superiority, they were required to have served a certain number of years and given proofs of courage. The first formation of a regular company of grenadiers was in 1670, after which they were gradually attached to many of the regiments in the French army, and finally became an established adjunct to each battalion. They were now chosen from the infantry, and ceased to bear the arm from which they took their name. A company of horse grenadiers was introduced among the household troops of France in 1814, but was suppressed on the second restoration. In the French army in 1858 there were 8 grenadier regiments belonging to the imperial guard; in

the British, one regiment of grenadier guards; in the Austrian, one battalion to each of the 63 regiments of the line; in the Russian, 4 corps of 4 regiments each; and in the Prussian, 3 regiments.

**GRENOBLE** (anc. *Oularo* or *Gratianopolis*), a fortified city of France, capital of the department of Isère, built on both sides of the river of that name, 58 m. S. E. from Lyons and 290 m. S. E. from Paris; pop. in 1858, 28,869. The old part of the city, called the faubourg St. Laurent, is situated on the N. bank of the river, and is connected with the modern quarter on the opposite bank by two bridges. The city is badly built, but has lately been improved, and contains some fine buildings, among which are the church of Notre Dame, the episcopal palace, hospital, several convents, halls of justice, a theatre, arsenal, and citadel. It has a beautiful public garden, a normal school, schools of design and of architecture, a college, a public library of 60,000 vols. and 1,900 MSS., a museum, a cabinet of natural history, manufactories of kid gloves (which alone employ 4,000 or 5,000 hands), liqueurs, leather, &c., and a trade in hemp, iron, and marble, which are produced in the vicinity. There is a bronze statue of the chevalier Bayard in the principal square. The city was called Gratianopolis in honor of the emperor Gratian in the 4th century, and its present name is a corruption of that word. It was afterward the capital of Dauphiné, and the building now used as a hall of justice is the ancient palace of the dauphins.

**GRENVILLE**, GEORGE, an English statesman, the reputed author of the famous stamp act, born Oct. 14, 1712, died Nov. 18, 1770. He was chosen to parliament in 1741, and continued a member till the time of his death. From 1744 to 1762 he was connected with the administration in several subordinate offices. In 1762 he was made secretary of state, and in the same year was transferred to the head of the admiralty. In 1768 he was appointed chancellor of the exchequer and first lord of the treasury, his brother Lord Temple being with Mr. Pitt in the opposition; but in 1765 he resigned the premiership, giving place to Lord Rockingham. He was distinguished for his eloquence and extensive knowledge, and during his public life was always regarded as by far the ablest man of business in the house of commons. He agreed with Lord Temple on the right of the mother country to tax the American colonies. He introduced a bill for the regular payment of the navy, which was passed in 1757, and another for the trial of contested elections, passed in 1770.

**GRENVILLE**, LORD. See WYNDHAM, Wm.

**GRENVILLE**, RICHARD. See TEMPLE, EARL.

**GRENVILLE**, or **GREENVILLE**, SIR RICHARD, an English naval officer, and one of the first colonizers of North America, born in the west of England in 1540, died in 1591. He was descended from an ancient family, and was nearly related to Sir Walter Raleigh. At the age of 16

he served in the German imperial army as a volunteer against the Turks in Hungary. On his return he was appointed to a command in the army in Ireland, and notwithstanding his youth was made sheriff of Cork. In 1571 he represented the county of Cornwall in parliament, and afterward, being made high sheriff of that county, was knighted by Queen Elizabeth. He entered with ardor into Raleigh's schemes of colonization in America, and in 1585 was selected to command the fleet of 7 vessels carrying 108 colonists which Raleigh fitted out and despatched to Carolina. He sailed from Plymouth, April 9, accompanied by Cavendish, the famous navigator, by Harriot, the inventor of the system of notation in modern algebra, and by With, a painter of considerable note. On its way the fleet touched at the Canaries and at the West Indies, where it captured two Spanish frigates, and on June 20 it made the mainland of Carolina, or Florida, as it was then called. It narrowly escaped being wrecked on the cape to which Grenville, in consequence, gave its present name of Cape Fear. On June 26 it anchored at Wooten, and passing through Ocracoke inlet made its way to Roanoke. Grenville, accompanied by a party of men, explored the country for 8 days, and in revenge for the theft of a silver cup burned an Indian village and destroyed the standing corn. In August, after having landed the colonists, whom he left under command of Ralph Lane, he sailed with his ships for England, Aug. 25. On his way home he took a rich Spanish vessel, and was received at Plymouth with high honors, Sept. 18. The next year he recrossed the Atlantic with 3 ships laden with supplies, and found his colony broken up and the settlers gone. They had departed about 8 weeks before in the vessels of a fleet commanded by Sir Francis Drake, who on his way home from the West Indies had paid them a visit, and, finding them tired of their situation, had taken them on board. Grenville, to keep possession of the country, left 15 men on Roanoke island, and sailed again for England. In 1588 he was made a member of the council created to devise means of defence against the Spanish armada, and in 1591 was raised to the rank of vice-admiral and sent with 5 ships to cruise against the Spaniards in the West Indies. Off the Azores he encountered a great Spanish fleet of 58 ships with 10,000 men on board. He gave them battle at 8 P. M., fought them till daybreak next day, and beat them off 15 times. Four of the Spanish ships sunk during the action or soon afterward, and 1,000 Spaniards were killed. Grenville was wounded early in the fight, but refused to go below, and had his wounds dressed on deck. He was at length shot through the body, and was carried into his cabin, upon which his crew, of whom but a few were left alive and unwounded, surrendered. He was taken on board a Spanish ship and well treated, but died in 8 days. His last words, spoken in Spanish, were: "Here die I, Richard Grenville, with a joyful

and quiet mind; for that I have ended my life as a true soldier ought to do, fighting for his country, queen, religion, and honor; my soul willingly departing from this body, leaving behind the lasting fame of having behaved as every valiant soldier is in duty bound to do."

GRESHAM, SIR THOMAS, an English merchant, born in London in 1519, died there, Nov. 21, 1579. He was educated at Caius college, Cambridge, and was afterward apprenticed to his uncle, an eminent London merchant. He was employed in 1551 in negotiating foreign loans for the government of Edward VI., and subsequently for those of Mary and Elizabeth; and to him belongs the merit of having been the first to suggest to the latter the advantage of raising loans from her own subjects rather than from those of foreign states. His financial experience and sagacity enabled him to render good service to the crown, and he was so high in the favor of Elizabeth that she frequently visited him at his country seat, and honored him with knighthood in 1559. Gresham accumulated immense wealth, built himself a splendid residence in London, and purchased valuable estates in various parts of England. He was the founder of the first royal exchange, and of the institution called Gresham college. By his will his London residence was vested in trustees, who were to see that 7 able lecturers, each with a salary of £50 per annum, payable from the rents of the exchange, and having apartments in the above building, were elected to deliver lectures there on divinity, astronomy, music, geometry, law, physic, and rhetoric. In 1768 the building was sold to government, and the character of the institution considerably modified by act of parliament; the lectures were subsequently read at the royal exchange until it was burned in 1838, and in 1843 the present college was erected.

GRESSET, JEAN BAPTISTE LOUIS, a French author, born in Amiens in 1709, died in 1777. He was educated at a college of the Jesuits, and at the age of 16 entered the order as a novice. In 1738 he published a poem under the title of *Vert-vert*, in which he ridiculed some of the features of convent life. Having removed to Paris, he produced successively *La Chartreuse*, *Le carême impromptu*, *Le lutrin vivant*, and *Les ombres*, all of which were received with great favor on account of their spirited style and elegant versification. The freedom of some of his remarks, however, drew upon him the displeasure of his religious superiors; and having first been transferred from the capital to a provincial station, he finally left the order before the end of his novitiate. He now returned to Paris, where he produced a tragedy, *Edouard III.*, and a few years later, *Sidney*, a drama in 3 acts. In 1747 appeared his comedy of *Le méchant*, which procured him admission to the French academy. He was also a member of the academy of Berlin, and one of the literary correspondents of Frederic the Great, to whom he addressed an ode which the royal *littérateur* answered by some very indifferent verses. In

the midst of his successes Gresset retired to Amiens, where having married he passed his time in religious employments, in the care of his family, and in attacking various abuses of the clergy. He condemned the irreligious tendency of his past works, committed several unpublished pieces to the flames, and asked pardon of heaven for his literary transgressions in a copy of verses which Voltaire and Piron ridiculed. He founded an academy of letters at Amiens, and, as director of the French academy, was chosen to congratulate Louis XVI. and Marie Antoinette on their accession to the throne in June, 1774; in return for which he received a patent of nobility, and was made historiographer of the order of St. Lazarus. An edition of Gresset's works in 8 vols. was published at Paris in 1811. *Vert-vert* was translated into English by J. G. Cooper (London, 1759), and by Alexander Geddes (4to., 1798).

GRETA, the name of 8 small rivers of England, remarkable for their picturesque scenery. I. A river of Cumberland which rises in Lake Thirlmere and falls into the Derwent below Keswick. II. A river of the N. riding of Yorkshire, formed by the confluence of several streams, and, after flowing through the cliff of Scargill, uniting with the Tees. III. A river of the W. riding of Yorkshire and county of Lancaster, rising on Whernside mountain and flowing into the Lune. In the valley of Chapeldale it has a subterranean fall in Wethercoat cave.

GREYNA GREEN, a small village of Scotland, in the co. of Dumfries, 9 m. W. of Carlisle, famous for the celebration of irregular marriages, until Dec. 31, 1856, when, by the act passed July 29, such marriages were declared invalid. The marriage ceremony consisted in an admission before witnesses by the parties that they were husband and wife, such admission being sufficient, according to the law of Scotland, to constitute a valid marriage. After the ceremony, the officiating functionary (of late years a blacksmith by trade) signed a certificate of marriage, which was also signed by two witnesses, and then the union of the parties became perfect and indissoluble. When they were English, the marriage service of the church of England was sometimes used. The number of these abnormal marriages celebrated at Gretna and the other border villages has been stated to amount on an average to about 500 a year.

GRÉTRY, ANDRÉ ERNEST MONESTÉ, a French composer, born in Liège, Feb. 11, 1741, died at Montmorency, near Paris, Sept. 24, 1813. At 6 years of age he was placed in the choir of the cathedral at Liège, was subsequently instructed in music by some of the masters of the place, and at 18 years of age went to Rome, where he pursued his studies for 8 years. Repairing to Paris, he encountered many disappointments, and was on the point of leaving the city in despair, when Marmontel's libretto, *Le Huron*, founded on Voltaire's tale, was put into his hands. In a few weeks the music was ready, and the first performance of the opera raised Grétry to the first

rank of composers. It was followed by *Lucile*, *Zémire et Azor* (successfully produced upon the English stage under the title of "Selima and Azor"), *Céphale et Procris*, *Richard Cœur de Lion*, *Barbe-Bleue*, and many others, both serious and comic; and for nearly 40 years Grétry enjoyed a popularity in France which the efforts of rival composers could never impair. In 1823, many years after his death, his *Guillaume Tell* was produced in Paris with great care; and such was the enthusiasm which the performance evoked that the composer's bust was brought upon the stage attended by the principal singers, who crowned it with laurels. His principal operas are full of grace and spirit, and the music is melodious and dramatic. The authors of his librettos were in nearly every instance men of genius, which will in a measure account for the uniform success of his works. He is considered one of the principal founders of the French comic opera. In 1780 he published his *Essai sur la musique* (8 vols. 8vo.).

GREUZE, JEAN BAPTISTE, a French painter, born in Tournus, Burgundy, in 1726, died in Paris, March 21, 1805. He commenced his career as a portrait painter; failing in which, he devoted himself to pictures of *genre*. His first works in this class, "A Father explaining the Scriptures to his Family," and the "Paralytic Father," gained him admission to the academy as an associate. For this occasion he painted a historical piece, "Severus reproaching his Son Caracalla," which the academy refused to notice, declaring that his admission was wholly due to his merit as a painter of *genre*. Greuze, however, was ambitious to become a historical painter, and even went to Rome to study the old masters. He soon had the wisdom to return to his former style, in which to the end of his career he enjoyed a great reputation. His pictures are highly prized by collectors, and command enormous prices. Among the most celebrated are "The Blind Man cheated," "The Village Bride," "The Broken Pitcher," "The Unnatural Father," and "The Little Girl and the Dog;" the last is by many considered his best picture. These and many others have been repeatedly engraved.

GREVILLE, SIR FULKE (LORD BROOKE), an English statesman and author, born in Warwickshire in 1554, died in London, Sept. 30, 1623. He studied both at Cambridge and Oxford. After travelling on the continent, he was presented to Elizabeth, who conferred on him many marks of favor. In 1597 he was knighted, and for several years represented his native county in parliament. In 1615 he was made under treasurer and chancellor of the exchequer, and in 1621 he was elevated to the peerage with the title of Baron Brooke of Beauchamp's Court. His death resulted from a wound received from an enraged domestic who did not consider his services adequately rewarded. He was a relative and an intimate friend of Sir Philip Sidney. His principal works are: "The Nature of Truth" (8vo., 1641); "Life of the renowned Sir Philip

Sidney" (12mo., 1652); "A Treatise of Human Learning, in 16 Stanzas;" "A Treatise of Warres, in 68 Stanzas;" two tragedies, letters, minor poems, &c. There are 2 collections of his writings: "Certaine Learned and Elegant Workes of Rt. Hon. Fulke Lord Brooke, written in his Youth and familiar Exercise with Sir Philip Sidney" (fol., 1683); and "Remains of Sir Fulke Greville, Lord Brooke" (8vo., 1670). "The Five Years of King James, or the Condition of the State of England" (4to., London, 1648), which bears his name, is probably not authentic. Greville's style is more profound than graceful, and displays more intellect than imagination. Charles Lamb says: "He is nine parts Maecchiavelli and Tacitus for one of Sophocles or Seneca." The inscription on his tomb calls him "the servant of Queen Elizabeth, the counsellor of King James, and the friend of Sir Philip Sidney."

GREW, NEHEMIAH, an English physician and botanist, born in Coventry about 1628, died in London, March 25, 1711. At the restoration he was sent to a foreign university, where he obtained his degree of M.D. In 1672 he settled in London, and was elected a fellow of the royal society, and in 1677 its secretary. He enjoyed considerable practice as a physician, and was highly respected for his virtues and learning. He was the first Englishman who applied himself to the study of vegetable anatomy and physiology. His principal works are: "The Anatomy of Plants, with an Idea of the Philosophical History of Plants" (fol., 1682); "Cosmologia Sacra, or a Discourse of the Universe as it is the Creature and Kingdom of God" (fol., London, 1701); and "A Catalogue and Description of the Natural and Artificial Rarities belonging to the Royal Society."

GREY, a co. of Canada West, bounded N. E. by Georgian bay and Owen sound; area, 2,321 sq. m.; pop. in 1851, 18,217. The land is rough, sandy, and stony, but supports a valuable growth of pine. It is watered by Saugeen river and smaller streams. Capital, Sydenham.

GREY, CHARLES, 2d earl, an English statesman, born at Fallowden near Alnwick, Northumberland, March 18, 1764, died at Howick house, Northumberland, July 17, 1845. His parliamentary career began in 1786, and for 47 years he occupied a distinguished position in English politics. He entered parliament as member for Northumberland, and attached himself to the whig party, then under the leadership of Fox. In 1788 he was appointed one of the managers of the trial of Warren Hastings. In 1792 he was one of the founders of the "Society of the Friends of the People," whose object it was to obtain a reform in parliament. About this time, too, he attempted to mitigate the law of imprisonment for debt. Being in opposition, he unsuccessfully endeavored to obtain a committee of inquiry into the conduct of ministers in having brought foreign troops into England without the consent of parliament, into their suspension of the habeas corpus act, their misapplication of the

public treasure, and their unauthorized loan to the emperor of Germany. In 1797 he brought forward a definite plan of parliamentary reform, proposing that the counties should return 118 members, and the remaining 400 be elected by household suffrage. The motion was lost by a vote of 258 to 98. Again, in 1799, he took advantage of the debates on the legislative union with Ireland, to propose that a number of Irish "rotten boroughs," as they were called, should be disfranchised, and that the number of members should remain the same notwithstanding the admission of the Irish representatives. Pitt having died in 1806, a new ministry was formed under Lord Grenville, and Grey, now Baron Howick, was appointed first lord of the admiralty, Fox being minister of foreign affairs. Fox dying in September, Grey took his place. Lord Grenville and he were now the recognized leaders of the whig party, Grenville in the house of lords and Grey in the commons. During this session Grey carried through the bill for the abolition of the slave trade, and moved the abolition of the oath which excluded Roman Catholics from rank in the army and navy. His proposal was met with violent opposition by the Protestant interest, and the king exacted from his ministers a written pledge that they would not press a measure which he considered perilous to church and state. Grey declined to give such a promise, resigned office, and the cabinet was broken up. The death of his father in the succeeding year called him as Earl Grey to the house of lords. He refused several offers of office during the next 5 years. For the 18 years succeeding the death of Perceval (1812 to 1830) Earl Grey ably led the opposition. The chief events of his career during this period were his opposition to a renewal of the war in 1815; his condemnation of the coercive measures of the government against the people in the depression and restlessness which followed the peace; his opposition to every attempt to abridge the right of public meeting, and to the bill of pains and penalties against Queen Caroline; his support of Huskisson's measures of commercial reform; and his vehement hostility to Canning's administration. He had the satisfaction, however, of seeing, in 1829, the Catholic emancipation act passed. The French revolution of 1830 and other causes having given a new impulse to the agitation for reform, the tory ministry under Wellington was obliged to retire, and William IV. requested Earl Grey to form a government; he consented only on condition that the reform of the parliamentary representation should be brought forward as a cabinet question. In Nov. 1830, the new premier announced in the house of lords that the policy of his administration would be "peace, retrenchment, and reform;" and in March, 1831, the first reform bill was introduced by Lord John Russell in the house of commons. (See PARLIAMENT.) On May 7, 1832, a motion having been carried which was considered hostile to the reform measure, the ministry re-

signed, and the duke of Wellington undertook to form a new administration. On May 17, however, Earl Grey returned to power; on June 4 the reform bill passed the house of lords, and 3 days afterward it received the royal assent. The other measures of Earl Grey's administration were of a liberal nature. Among the early measures which occupied the attention of the reformed parliament were the abolition of slavery in the colonies, the renewal of the East India company's charter, the reform of the Irish church, poor law and municipal reform, with the questions of education, the currency, &c. Irish affairs led to his final resignation in Nov. 1834. The last years of his life were passed with his family at Howick house, his ancestral seat.—HENRY GEORGE, 8d earl, son of the preceding, born Dec. 28, 1802, entered parliament in 1829. On the formation of the reform ministry by his father, in 1830, Lord Howick, as he was called, was appointed under secretary for the colonies, but resigned in 1833 in consequence of his disapproving the details of the measure for negro emancipation. He afterward held, for a few months of 1834, the post of under secretary for the home department. He was secretary at war in the Melbourne administration from 1835 to 1839. When the Peel administration came in, he earned the reputation of being one of the most brilliant men of the opposition. On his father's death, in July, 1845, he took his seat in the house of lords as Earl Grey, and in the succeeding year was appointed secretary for the colonies in the administration of Lord John Russell. On his retirement with his colleagues in 1852, he published in 2 vols. a defence of his colonial policy. Since then he has held no cabinet office, although in 1854 he was invited to accept the post of secretary of war, which he refused because he did not consider the war with Russia either just or necessary.—SIR GEORGE, an English statesman, cousin of the preceding, born at Gibraltar, May 11, 1799. He was educated at Oxford, and was called to the bar in 1826. He entered parliament, in the whig interest, in Dec. 1832, and was under secretary for the colonies in 1834, and again from April, 1835, till 1839, when he became judge advocate, which office, in 1841, he exchanged for the chancellorship of the duchy of Lancaster. From this date till 1846 he remained in opposition, but in the latter year Lord John Russell came into office and appointed him secretary for the home department. In this position he remained till 1852, being reappointed on the accession to power of Lord Palmerston in the early part of 1855. On the accession of the earl of Derby in 1858 he retired with the other members of the cabinet. In June, 1859, he joined Lord Palmerston's administration as chancellor of the duchy of Lancaster.—Another SIR GEORGE GREY, born about 1810, officiated as governor of New Zealand from 1846 to 1854, since which time he has held the same office at the Cape of Good Hope. He is the author of "Journals of Two Expeditions of

Discovery in N. W. and W. Australia" (3 vols. 8vo., London, 1841), and "Polynesian Mythology and Ancient Traditional History of the New Zealand Race" (8vo., 1855). He possessed a celebrated library, especially rich in geographical and ethnological works. The German savant Dr. H. J. Bleck assisted him in the arrangement of the catalogue, and published in 1859 a critical list of the philological works which refer to African and Polynesian languages.

GREY, LADY JANE, a noble English lady, born at Broadgate, her father's estate in Leicestershire, in 1587, beheaded at the tower of London, Feb. 12, 1554. She was of the blood royal, being the great-granddaughter of Henry VII., whose daughter Mary, the young widow of Louis XII. of France, became the wife of Charles Brandon, duke of Suffolk. Their daughter, Lady Frances Brandon, was married to Henry Grey, marquis of Dorset, afterward duke of Suffolk. Lady Jane Grey was the eldest of 3 daughters of this pair, who had no male issue. She suffered much rigorous treatment in early childhood, her parents conforming severely to the custom of the day in maintaining an unnatural distance and over-rigid authority in family discipline. This circumstance became an additional motive to the daughter for seeking solace in study and self-improvement. Her remarkable talents early displayed themselves, and her parents placed her under the tutorship of John Aylmer, afterward bishop of London. At the age of 15 she spoke and wrote Greek, Latin, Italian, and French, with ease and correctness; she had some knowledge at the same time of Hebrew, Chaldee, and Arabic. To these accomplishments (not entirely unusual to young ladies of the period) were added sweetness of disposition and piety of heart. The king, Edward VI., was disposed to bequeath his crown to her in consequence of his aversion to the Catholic principles of his sister Mary, and of the impossibility of excluding this sister on the plea of illegitimacy, without also excluding Elizabeth on the same grounds. The duke of Northumberland, well knowing Edward's disposition, effected a marriage between Lady Jane and his own son, Lord Guilford Dudley. His machinations meanwhile were otherwise so successful that King Edward gave his final consent to the succession of the bride. Royal letters patent were signed and sealed, excluding the princesses Mary and Elizabeth, whose rights were affirmed by the will of Henry VIII., and settling the crown upon the heirs of the duchess of Suffolk. The king's health, which had languished for a year past, from this time rapidly declined, his physicians being dismissed, and the royal patient committed to a creature of Northumberland. The duke did not communicate his plan to his daughter-in-law until July 10, 1553, 4 days after the king's death, when he repaired to her residence at Sion House, and approached her with the ceremony usual to royal state. She accepted the crown not without great re-

luctance, and according to some authorities yielded only to the entreaties of her husband and father. It was the custom that the first days of a new reign should be passed by the sovereign in the tower of London. Lady Jane Grey was accordingly conducted thither. She was proclaimed queen, but without the slightest manifestation of welcome by the people. Northumberland and Suffolk were so disliked, that not even the horror with which the princess Mary was regarded by the Protestant party could diminish the popular ill feeling toward them. Mary and Elizabeth had both narrowly escaped falling into the hands of the latter. Timely warning had been sent to Mary by the earl of Arundel, and she approached London with a force of 12,000 men. The most considerable nobles and gentry declared for her without delay; and the duke of Suffolk, who had been appointed by Northumberland to command the army, could bring but little over 6,000 troops into the field. Northumberland, seeing the danger, and losing all confidence in Suffolk, whose capacities appear to have been inconsiderable, hastened to take the command in person. His departure from London was the signal for a general desertion of the cause. The mayor and council proclaimed Queen Mary. Even Suffolk deserted his hapless daughter, who, after the vain pageantry of 10 days of royal state, would willingly have withdrawn to her private abode. Mary entered the capital in triumph. Northumberland, falling upon his knees, begged abjectly for life, but was executed with two of his most active adherents, Sir Thomas Palmer and Sir John Gate. Suffolk was set at liberty, and the queen would not consent to the death of Lady Jane, though urged by her ministers to do so. Sentence, however, was pronounced against her and her husband, without any immediate intention of putting it into execution, and they were confined in the tower. But Wyatt's insurrection, in which Suffolk was mad enough to engage, perhaps with the purpose of reviving his daughter's claim, aroused Mary to a conviction of the danger of allowing the unhappy young couple to live, and on Feb. 8, 1554, she signed a warrant for their execution. Dudley was beheaded on Tower hill; Jane, on account of her royal blood, was allowed to suffer within the precincts of the tower. She met her fate with calmness and piety, refusing to take leave of her husband, whom she hoped that day to meet in heaven.

**GREYHOUND** (*canis venaticus*), a species of dog characterized by a narrow and sharp head, a nose greatly prolonged, and with its plane passing with little elevation nearly to the occiput, long neck, deep chest, arched loins, abdomen much drawn up, and buttocks elevated; the stature is high on account of the elongated and slender limbs; the ears are small, pointed, and semi-pendulous; the tail long and slender, and in the original races fringed. The whole structure is extremely elegant and graceful, and every thing seems designed to constitute the

animal the swiftest of the carnivora; hunting by sight alone, the eyes are large and prominent; where the speed is so great, there is no need of the acute sense of smell of the ordinary hounds; its sagacity is small, and it has but little of the personal attachment to man so characteristic of the dog family; its temper is capricious, sometimes ferocious, and it is said to be the least liable of dogs to hydrophobia. Representations of the greyhound are found on the oldest Egyptian monuments, at which remote epoch it was used not only as a hunting dog, but formed a race of unowned street dogs which had relapsed from want of human care into a half wild condition; changes of food and climate have not essentially modified this ancient type, except perhaps in the hair, and even the latter is doubtful. The permanence and peculiarities of the greyhound characters indicate that it arose from an aboriginal independent species, whose primitive seat was probably in the extensive plains of western Asia, extending from Hindostan and Persia through Tartary to Russia, where now the largest breeds of the race exist, and whence they were carried by or followed man in his migrations into Egypt and Europe. The general colors are black, white, and slaty; the northern breeds have long and shaggy hair, while the southern are smooth or silky, from the effects of climate or from an original difference. The largest and fiercest greyhounds are those with long hair, like those of the Deccan and Persia, the former of which is of a yellowish tan color, and the latter slaty or white, the hair of both being rather soft; the Arabian greyhound, variously crossed, is large and strong; these are probably derived from some of the dholes of India and the thous (*C. anthus*) of Egypt. (See Dog.) The Russian and Tartar breeds are large, rough, usually white, black clouded, with long hairy tails; the Scotch greyhound is of the same breed, but, from a probable cross with a staghound, has an excellent nose and considerable sagacity, with great speed and endurance; the Irish greyhound, the largest dog of western Europe, and more than a match for a wolf, is considered of the same breed with the last, crossed in various localities with the great Danish dog, the staghound, and bloodhound; the Grecian greyhound, still extant as described by the old classic writers, and used in deer hunting, has a rather short and soft fur, of a slaty and white color. Among the smooth-haired breeds are the Turkish, with long hairy ears, very pointed nose, and ashy, white, or brindled color; the Italian, of small size, elegant in appearance, very delicate, swift, and chiefly regarded as a lady's pet (there is a larger variety resembling this in the Barbary States); and the British greyhound, unrivalled in speed, beauty, spirit, and docility, principally used in the chase of the hare; the last is the most common in western Europe and in the United States. The lurcher (*C. vertagus*) was originally a greyhound, but, from mixture

with other breeds and from want of care, has degenerated into a gaunt, ill-looking, ferocious race, the special favorite of poachers, and sometimes hunting deer and destroying sheep on its own account. Among the street dogs or pariahs of Egypt, degraded by intermixture, disease, and famine, are to be seen many still retaining the marks of the old pure greyhound; most of them are nearly destitute of hair, but some possess the original yellowish tan-colored coat.

**GREYTOWN.** See **SAN JUAN DE NICARAGUA.**

**GRIDLEY, JEREMIAH**, an American lawyer, born about 1705, died Sept. 10, 1767. He was educated at Harvard college, and was subsequently editor of the "Weekly Rehearsal," a newspaper established in Boston in 1781. He soon acquired great reputation as a lawyer, and was appointed attorney-general for the province of Massachusetts. In 1761, while holding this office, he defended the writs of assistance which the Boston custom-house officers had applied for to enable them to enter at discretion the dwellings of suspected individuals. He was not less eminent for his classical attainments than for his legal ability and learning.—**RICHARD**, an American general, brother of the preceding, born in Boston, Mass., in 1711, died in Stoughton, June 20, 1796. In 1746 he served as engineer at the siege of Louisburg. In 1755 he was made chief engineer and colonel of infantry, and in the following year he took part in the expedition to Crown Point under Winslow, and constructed the fortifications on Lake George. In 1758 he served under Amherst, and subsequently under Wolfe on the plains of Abraham. At the conclusion of the war he received Magdalen island and half pay as the reward of his services. On the outbreak of the revolutionary war he was appointed chief engineer, and constructed the fortifications on Breed's hill the night before the battle of June 17, 1775, when he was wounded.

**GRIER, ROBERT COOPER**, an American judge, born in Cumberland co., Penn., March 5, 1794. His father, the Rev. Isaac Grier, soon after the birth of his son, removed to Lycoming co., where he carried on a farm, taught a grammar school, and at the same time preached to 3 congregations. He was a good Greek and Latin teacher, and himself educated his son till the latter at the age of 17 entered the junior class of Dickinson college. In 1806 the father removed to Northumberland, Penn. to take charge of an academy there, which under his management became so prosperous, and attained so high a character, that it received a charter as a college. Robert was graduated in 1812; and after teaching for a year at Dickinson college, he returned to Northumberland to aid his father, who was now growing infirm, and who died in 1815. His son, though only 21 years of age, was appointed to succeed him as principal, and for a year or two he taught Greek and Latin, mathematics and astronomy, lectured on chemistry, and in the intervals of

his professional duties studied law. He was admitted to the bar in 1817, and for a short time practised in Bloomsburg, Penn., whence in 1818 he removed to Danville in the same county. Here he pursued his profession with energy and success, supporting by his exertions his mother and 10 brothers and sisters younger than himself, whom he liberally educated. On May 4, 1838, he was appointed by the governor of Pennsylvania president judge of the district court of Alleghany co. In the same year he removed to Alleghany City, where he remained till Sept. 1848, when he removed to Philadelphia, where he still resides. On Aug. 4, 1844, he was nominated by President Polk one of the justices of the supreme court of the United States, in place of Judge Baldwin, deceased, and was unanimously confirmed by the senate on the same day. He still holds the office.

**GRIESBACH, JOHANN JAKOB**, a German biblical critic, born in Butzbach, Hesse-Darmstadt, Jan. 4, 1745, died in Jena, March 24, 1813. He was educated at the universities of Tübingen, Halle, and Leipzig, where he particularly distinguished himself in theology and biblical literature. He was the favorite pupil of Semler and Ernesti. While yet a very young man he resolved to devote himself to the critical study of the original text of the New Testament. To collect materials for this work, he made a literary tour through Germany, Holland, England, and France. In 1778 he was made extraordinary professor of theology at Halle, and subsequently was elected a professor of divinity at the university of Jena, of which institution he became rector in 1780. His reputation for ability and erudition was now so high that he was chosen prelate and deputy of the district of Jena, and appointed ecclesiastical councillor to the duke of Saxe-Weimar. The first edition of Griesbach's Greek Testament was published at Halle in 1774. The second edition was not completed till 1807. It has been twice reprinted in London, first in 1809, and again in 1818, and an American edition, edited by the Rev. J. S. Buckminster, was published at Boston in 1808. Dr. Marsh pronounced Griesbach to be "the most consummate critic that ever undertook an edition of the New Testament;" but notwithstanding this flattering eulogium, his canons of criticism have been violently assailed by many of the ablest biblical scholars in Germany and England.

**GRIFFIN**, a fabulous monster, half bird, half beast, that dwelt originally in the Rhipæan mountains, and guarded the gold of the Hyperborean regions from the one-eyed Arimaspians. Griffins were also supposed to watch over the treasures of India, and it is not unlikely that the origin of this monster is to be sought in the East, where its use seems to have been common. The fabulists and poets of antiquity represent it with the body of a lion, the head and wings of an eagle, the ears of a horse, and a comb of fishes' fins.

**GRIFFIN**, a city, capital of Spaulding co.,

Ga., on the Macon and western railroad, 58 m. N. W. from Macon; pop. in 1853, 2,320. It is a healthy and prosperous place, one of the most important railroad stations in the state, and the centre of an active trade. Nearly 50,000 bales of cotton are received here annually. Most of the stores and dwellings are of brick, the schools are good and numerous, and the city contained in 1850 3 churches (Baptist, Methodist, and Presbyterian), 3 hotels, 2 weekly newspaper offices, 2 banks, and 2 bank agencies. It is the seat of a homœopathic medical college, the Griffin female college, and the Synodical (Presbyterian) female college. It was laid out in 1840.

GRIFFIN, EDWARD DORR, D.D., an American divine, born in East Haddam, Conn., Jan. 6, 1770, died in Newark, N. J., Nov. 8, 1837. He was graduated at Yale college in 1790, and having studied theology with the younger President Edwards, was licensed to preach in Oct. 1792. In 1796 he was settled as pastor of the Congregational church in New Hartford, Conn., from which in 1801 he was called to the first Presbyterian church in Newark, N. J., where he remained till 1809. In 1808 he received the degree of D.D. from Union college. In the same year he was appointed to the professorship of sacred rhetoric in the Andover theological seminary, which office he filled till 1811, when he became pastor of Park street church, Boston, where he delivered his well known Park street lectures, an able and eloquent exposition of that form of Calvinism which they are designed to illustrate. In 1815 he accepted a call to the 2d Presbyterian church in Newark, and in 1821 was invited to become president of the college at Danville, Ky., of another in Cincinnati, and of Williams college, Mass. He accepted the latter appointment, and devoted himself most earnestly and successfully to its interests till 1836, when he resigned his office, and removed again to Newark, where he ended his days. Dr. Griffin was a clear and vigorous writer, and an able and exceedingly eloquent preacher. His publications were numerous, consisting chiefly of sermons and addresses, a selection from which, with a memoir of his life, by the Rev. Dr. Sprague, was published in 2 vols. in 1839, and an additional volume of sermons in 1844.

GRIFFIN, GERALD, an Irish novelist, born in Limerick, Dec. 12, 1803, died in Cork, June 12, 1840. When he was about 17 years of age his family migrated to the United States, leaving him under the care of an elder brother, who resided at Adare, near Limerick. He now began to write poetry and occasional pieces for the journals of Limerick. Determining to devote himself to a literary career, he went in 1823 to London with "Aguire," a tragedy, composed two years previous, but which he was unable to dispose of. Another called "Gisippus" (performed, after the author's death, at Drury Lane with complete success) proving equally unfortunate, he was forced to become a writer for the periodical press, and for several

years was familiar with various mutations of fortune. He gradually acquired a reputation as a brilliant magazine writer, and in 1827 published his "Holland-tide," which was followed shortly by "Tales of the Munster Festivals," both designed to illustrate the manners of the Irish peasantry. In 1828 appeared "The Collegians," the most successful of his novels, containing pictures of Irish life unsurpassed in truthfulness. During the next 10 years he was actively employed in writing novels, the chief among which were "The Invasion," "The Rivals," "The Duke of Monmouth," &c. In 1838 he joined the society of the Christian brothers, with whom he was connected until his death. His works have been published in New York in 10 vols., with a memoir by his brother.

GRIFFITH, WILLIAM, an English physician and naturalist, born in 1810, died in Malacca, Feb. 9, 1845. He was educated at the London university, where he greatly distinguished himself by his proficiency in botany. In 1832 he went out to India as assistant surgeon, and shortly after his arrival was appointed by the Bengal government to examine the botany of Tenasserim. In 1835 he was selected to accompany Dr. Wallich to Assam for the purpose of reporting on the growth of the tea plant. In 1837 he accompanied Capt. Pemberton on his mission to Bootan, and was subsequently sent with the army of the Indus to examine the vegetable productions of Afghanistan. In 1841 he was placed on the medical staff at Malacca, where he remained till his death. He collected animals as well as plants, and at the time of his death his collection of birds alone numbered 600 specimens. He published many papers in scientific and other journals, and intended to write a complete "Flora of India."

GRIJALVA, JUAN DE, the first Spanish navigator who landed on the coast of Mexico and opened an intercourse with the Aztecs, born in Cuellar in the latter part of the 15th century, slain by the Indians in Nicaragua, Jan. 21, 1527. He was intrusted by his uncle, Don Diego Velasquez, the first governor of Cuba, with the command of a fleet of 4 vessels, which, on May 1, 1518, sailed from St. Jago de Cuba, to complete the discoveries which Fernandez de Cordova had made in Yucatan the preceding year. He coasted for some distance along the peninsula of Yucatan, and, rounding it, extended his explorations as far as the province of Panuco, giving his name and that of his companion, Alvarado, afterward famous in the expedition of Cortes, to two rivers on the coast. His communication with the Aztecs was friendly, and so profitable to the Spaniards that they were enabled to send back one of the ships well freighted with gold, jewels, and other treasures, the acquisition of which was one of the main objects of the expedition. On his return to Cuba he found an expedition organizing for the conquest of Mexico, with Cortes at the head, and was received by Velasquez with reproaches for having neglected to plant colonies on the coast.



Grijalva, a man of integrity and prudence, had, however, acted strictly in conformity with his instructions, and against his own judgment. In the latter part of his life he settled in Nicaragua, and was slain in an outbreak of the Indians in the valley of Ulancho.

GRIGOROVITCH, NICOLOAI, a Russian novelist, born in the government of Simbirek in 1822. His first novel, "The Village," appeared in 1846, and was followed by many others in which the condition of the Russian serfs is vividly described.

GRILLPARZER, FRANZ, a German dramatist, born in Vienna, Jan. 15, 1790. For many years he was an officer of the imperial court, and in 1832 was appointed keeper of the exchequer archives. He was first brought into notice by *Die Ahnfrau*, produced in 1816, a tragedy of the fatalistic school, the powerful supernatural machinery and literary merits of which have kept it upon the stage. In 1819 he produced *Sappho*, and in 1822 *Das Goldene Vlies*, a fantastic work. *König Ottokar's Glück und Ende*, produced in 1825, is a historical play of much dramatic interest, and is generally esteemed one of his finest works. In *Des Meeres und der Liebe Wellen* he has effectively dramatized the old story of Hero and Leander. *Der Traum ein Leben*, produced in 1840, is a dramatic poem of great beauty.

GRIMALDI, one of the 4 great patrician families distinguished in the history of Genoa during the middle ages. They derive their descent from Grimoald, mayor of the palace under Chilbert II., and first made their appearance in northern Italy in the 10th century. In 980 they gained possession of the lordship of Monaco, of which they remained the hereditary princes for 6 centuries. They belonged to the Guelph faction, and cooperated with the Fieschi in those incessant struggles with the Ghibellines, headed by the Doria and Spinola families, which kept Genoa in a turmoil, until the adoption of the law of 1359, excluding the nobles, both Guelph and Ghibelline, from holding supreme authority in the state. The Grimaldis possessed large estates in France and Italy, which added to their influence. Branches of the family exist now in Nice and southern France. Of the eminent men belonging to it the principal were: I. RANIERI, the first Genoese who led the fleet of the republic beyond the strait of Gibraltar. As an ally of Philip the Fair of France, he defeated in 1304 the Flemish fleet under Guy of Flanders, whom he took prisoner. II. CARLO, surnamed the Great, who commanded the Genoese archers in the battle of Crécy. His troops, rendered helpless by the damage which a heavy shower had caused to their bowstrings, were attacked by both English and French, and a dreadful carnage ensued, in which their commander was killed. III. ANTONIO, a Genoese admiral, who in 1382 avenged the aggressions of the Catalonians and Aragonese by ravaging their coasts. The supremacy which the Genoese thus gained was

maintained until 1353, when the combined Catalanian and Venetian fleets, under the command of Nicolo Pisani, inflicted a disastrous defeat upon Grimaldi off the coast of Sardinia, by which the naval strength of Genoa was for a time prostrated. IV. GIOVANNI, who, in the service of the Milanese, gained a decided victory over the Venetian fleet under Trevesani on the Po, in 1431, taking numbers of galleys and immense spoils. V. DOMENICO, who distinguished himself as a zealous churchman, and also as a naval commander at the battle of Lepanto. He was advanced to the dignity of cardinal, and succeeded in extirpating heretical doctrines from his diocese. VI. GERONIMO, who died in 1638 at the age of 89. He was also an ecclesiastic, and as bishop of Aix effected some very wholesome reforms in his diocese. He annually distributed 100,000 livres in alms. He was sent as nuncio to Germany by Urban VIII., who rewarded his services with a cardinal's hat.

GRIMES, an E. co. of Texas, bounded W. by Navasoto and Brazos rivers; area, 962 sq. m.; pop. in 1858, 7,516, of whom 3,988 were slaves. The surface is rolling and occupied by prairies and forests. Much of the soil is a rich black loam. The productions in 1850 were 138,405 bushels of Indian corn, 29,437 of sweet potatoes, 2,282 bales of cotton, and 56,685 lbs. of butter. Value of real estate in 1858, \$1,132,320. The county is traversed by the projected route of the Galveston, Houston, and Henderson railroad, and by the Houston and Texas central railroad. Capital, Anderson.

GRIMKE, THOMAS SMITH, an American lawyer and scholar, born in Charleston, S. C., Sept. 26, 1786, died near Columbus, O., Oct. 12, 1834. He was descended from one of the Huguenots exiled by the revocation of the edict of Nantes. He was graduated at Yale college in 1807, studied law at Charleston in the office of Langdon Cheves, and rose to eminence at the bar and in the politics of his state. Among his more noted efforts were a speech in the state senate on the tariff question in 1828, in which he supported the general government, and an argument on the constitutionality of the South Carolina test act in 1834. He became more widely known by his addresses in behalf of peace, religion, and literature. An early and prominent advocate of the American peace society, he held the opinion that even defensive warfare is wicked; and when asked what he would do if he were mayor of Charleston and that city were attacked by a pirate ship, he answered in writing that he would call together the Sunday school children and lead them in procession to meet the pirates, who would be subdued to forbearance by the sight. Though a superior classical scholar, he maintained that neither the classics nor mathematics should enter into any scheme of general education in this country. He regarded all existing schemes as radically defective, in that they were neither American nor decidedly religious, and declared that the pure mathematics are absolutely useless to 99 out of every 100

who study them; that there is more power, fidelity, and beauty in Walter Scott than in a dozen Homers and Virgils; and that Mrs. Hemans has written more that is charming than both Horace and Anacreon. He urged the introduction of the Bible and of sacred literature as an essential part of all education. In some of his pamphlets he introduced a new system of orthography of the English language; the following are examples of his proposed amendments: disciplin, believ, deriv'd, enmitys, varys, varyd, multiply's, easier, center, battel, necessary, recomend, efectual. He published several addresses before Sunday schools and peace societies, and orations before the society of the Cincinnati at Charleston, July 4, 1809; on the character and objects of science before the literary and philosophical society of South Carolina in 1827; on the academical study of the Bible before the Phi Beta Kappa of Yale in 1880; and on American education before a society of teachers in Cincinnati in 1834, a few days before his death by cholera. A volume of his addresses was published at New Haven in 1831.—FREDERIC, brother of the preceding, born in Charleston, S. C., Sept. 1, 1791. He removed to Ohio, where he has held the office of judge, and where he still resides. He is the author of a work on the "Nature and Tendency of Free Institutions" (Cincinnati, 1848), which is used as a text-book in some colleges, and of an essay on "Ancient and Modern Literature."

GRIMM, FRIEDRICH MELOHIO, baron, a French critic, of German birth, born in Ratisbon, Dec. 26, 1723, died in Gotha, Dec. 19, 1807. After distinguishing himself as a scholar at the university of Leipsic, he accompanied the count of Schomberg to Paris as tutor to his children. He soon after became reader to the prince of Saxe-Gotha, gained the acquaintance of J. J. Rousseau about 1749 by his taste for music, was introduced by him into the circle of the encyclopædists, and was made secretary successively of Count Friesen and of the duke of Orleans. He was noted for romantic and sentimental amours, cultivated the friendship of distinguished artists as well as littérateurs, and in the contest between French and Italian music joined the coterie of critics which favored the Italians and assailed the French opera, and achieved his first literary success by a pamphlet entitled *Le petit prophète de Boëhmischbroda* (Paris, 1758), a plea in biblical style for the Italian music, which, together with several lively and enthusiastic critiques on the arts, gave him the reputation of one of the most brilliant French writers. Employed by the abbé Raynal to conduct his foreign correspondence, Grimm became the regular correspondent of 7 royal personages, among whom were the empress of Russia, the king of Sweden, and the king of Poland, chronicling for them the literary movements for which Paris was then distinguished. This correspondence, which gives a detailed history of French literature from 1753 to 1790, is one of the best collections of criticism

of the 18th century, consisting of analyses of books, portraits, reflections, anecdotes, songs, parodies, epigrams, raileries, and precise, delicate, and generally impartial judgments. No important work appeared in France during that period which is not the subject of ingenious and piquant remarks. The ability with which he fulfilled his task secured to him the patronage of his crowned correspondents, and he was appointed in 1776 by the duke of Saxe-Gotha his envoy at the French court, and was created baron of the German empire and knight of the Russian order of St. Vladimir. He saw the outbreak of the French revolution and described its early scenes, but retired from Paris with the other members of the diplomatic corps, and passed his last years at the court of Gotha, holding from 1795 the title of minister plenipotentiary of Russia. His *Correspondance littéraire, philosophique et critique* was published in Paris (16 vols., 1812-'18), and his principal other works were added in a supplementary volume (1814). A new edition of the correspondence, edited and annotated by Taschereau, appeared in Paris (15 vols., 1829-'31), which contains passages suppressed by the censorship in the former edition, and which is made complete by a volume of the *Correspondance inédite de Grimm et Diderot*, edited by Chéron and Thory (Paris, 1829).

GRIMM, JAKOB LUDWIG, a German philologist and antiquary, born in Hanau, Jan. 4, 1785. After preparatory studies at the lyceum of Cassel, he applied himself to the law in the university of Marburg under Savigny, whom in 1805 he accompanied to Paris to aid him in exploring libraries. In the following year he returned to Cassel, was appointed secretary of war, and devoted his leisure to studying the literature of the middle ages, especially of mediæval Germany. He was made royal librarian on the creation of the kingdom of Westphalia in 1808, auditor in the council of state in 1809, and secretary of the Hessian legation at the headquarters of the allies and at the congress of Vienna in 1814 and 1815. He was afterward sent to Paris by the Prussian government to obtain the restitution of valuable manuscripts that had been carried thither by the armies of Napoleon. He was second librarian at Cassel from 1816 to 1830, when he accepted an invitation to Göttingen both as professor and librarian, and for 7 years delivered remarkable lectures on the antiquities of the German language, literature, and law. In 1837 he was one of the 7 professors who signed the protest against the abolition of the constitution by the king of Hanover, for which he with Dahlmann and Gervinus was deprived of his office and banished from the country. He published a pamphlet on the subject entitled *Jakob Grimm über seine Entlassung* (Basel, 1838). He lived in retirement in Cassel till in 1841 he was called to Berlin as member of the academy of sciences and as professor. He presided over the assemblies of German philologists held in Frankfort in 1846 and in Lü-

beck in 1847, and sat in the national assembly of 1848 and in the assembly of Gotha in 1849, voting with the moderate liberal party. From that time he has occupied himself only with his various publications. The archæological labors of Grimm are of unrivalled importance in the whole department of German literary antiquities. The constant aim of his researches has been to trace the spiritual life of the Germanic nations as revealed in their language, laws, customs, faiths, and poetry, and his works are mines of curious erudition. His first publication was *Ueber den altdutschen Meister-Gesang* (Göttingen, 1811). It was followed by his *Deutsche Grammatik* (vol. i., Göttingen, 1819; vols. ii.-iv., 1826-'37; new ed. 1853; to be completed in one more volume), which contains a history of the grammatical forms of all the Germanic dialects in the different eras of the language. His *Deutsche Rechtsalterthümer* (Göttingen, 1828; new ed. 1854) recounts the poetical and fantastic customs which flourished among the Germans in the middle ages; and his *Deutsche Mythologie* (Göttingen, 1835; 2d ed. 1843) is a complete discussion of the old gods of the North. His *Geschichte der deutschen Sprache* (2 vols., Leipzig, 1848; 2d ed. 1853) traces the ethnological affinities of the Germanic nations by comparative philology. Among his numerous other works are a collection of German proverbs, *Weisthümer* (3 vols., Göttingen, 1840-'42), and editions of the *Silva de romances viejos* (Vienna, 1818); of the *Hymnorum Veteris Ecclesie XXVI. Interpretatio Theotisca* (Göttingen, 1830); of the Anglo-Saxon poems *Andreas und Elene* (Cassel, 1840); of the *Lateinische Gedichte des X. und XI. Jahrhunderts* (Göttingen, 1838), in connection with Schmeller; and of the *Reinhard Fuchs* (Berlin, 1884), containing several forms of the poem, and an important introduction. He has also published, in connection with his brother Wilhelm Karl, the German *Kinder- und Hausmärchen* (Berlin, 1812; 7th ed. 1857), one of the most popular collections of juvenile stories; *Alt-deutsche Wälder* (3 vols., Cassel, 1818-'16); *Die Lieder der Alten Edda* (Berlin, 1815); *Deutsche Sagen* (2 vols., Berlin, 1816-'18); *Irische Elfen-Märchen* (Leipzig, 1826), founded on Croker's "Fairy Legends;" and the most comprehensive labor of his life, the *Deutsches Wörterbuch* (Leipzig, 1852 *et seq.*; 2 vols. have already appeared), in which no word employed in the literature between Luther and Goethe is to be omitted. —WILHELM KARL, brother of the preceding, a German philologist and antiquary, born in Hanau, Feb. 24, 1786. He was educated at Cassel and Marburg, was appointed in 1814 secretary of the library of Cassel, and in 1830 assistant librarian at Göttingen, where he became professor in 1835. He was deprived of this office in 1837, and accompanied his brother successively to Cassel and Berlin. He has devoted himself especially to the German mediæval poetry, and, beside the works which have been the joint productions of the brothers Grimm,

has written treatises *Ueber die deutschen Runen* (Göttingen, 1821) and *Ueber die deutschen Fingerringen* (Berlin, 1848); has translated the *Altdänische Heldenlieder, Balladen und Märchen* (Heidelberg, 1811); and has edited the *Große Ruodolf* (Göttingen, 1828); *Die deutsche Heldensage* (1829); *Der Freidank* (1834); *Der grosse Rosengarten* (1834); *Das Bolandlied* (1838); *Wernher von Niederrhein Verones* (1839); *Konrad von Wursburg golden Schmiede* (Berlin, 1840); *Athis und Prophias* (1846); *Exhortatio ad Plohem Christianum* (1848); and *Altdutsche Gespräche* (1851); for all of which he has furnished introductions and disquisitions of great value.—LUDWIG EM, brother of the preceding, a German painter and engraver, born in Hanau in 1790. He studied under Karl Hess at Munich, served in the campaign of 1818, and resumed his studies at Cassel and Munich, till in 1817 he went to Italy. He returned in the following year, and since 1833 has been professor in the academy of painting at Cassel. He has made more than 180 engravings, most of them his own compositions, of historical subjects, landscapes, animals, and heads. Of his paintings, a "Madonna" and numerous portraits are most admired. Most of them are in the gallery of the prince of Hesse.

GRINDAL, EDMUND, D.D., an English prelate, born at Kensington, Cumberland, in 1519, died in Croydon, July 6, 1583. He was early noticed by Secretary Cecil, Archbishop Parker, and Ridley, bishop of London. In 1549 he became president of Pembroke hall, Cambridge, and having greatly distinguished himself as a preacher, was in 1550 appointed by Ridley his private chaplain. The next year he was appointed chaplain to the king; but on the accession of Mary he fled to Strasbourg, where he remained till her death, when returning, he was employed to draw up the new liturgy, and, with 7 other Protestants, to oppose the Roman Catholic prelates in public debate. In 1559 he was made master of Pembroke hall, and the same year was nominated to succeed Bonner as bishop of London. In 1570 he was translated to the see of York, and 5 years after succeeded Parker as archbishop of Canterbury. Elizabeth, disliking the frequent meetings of the clergy for mutual improvement, directed Grindal to break up these "prophesyings," as they were called; and, venturing decidedly to question the propriety of doing it, he was by order of the star chamber confined to his house, and his see was sequestered from him. He was afterward partially restored to his power and place, but chose to resign his see, and receive a pension from the queen. He wrote but little, but a tract of his on the real presence is printed in Fox's "Acts and Monuments."

GRINDSTONE, a flat circular disk of sandstone, turning upon an axle passing through its centre, and used to grind the surfaces of bodies applied to its face while the stone is kept revolving. From the variety of purposes to which grindstones are applied in the arts,

for sharpening the edges of tools, reducing the surfaces of metallic bodies and of glass, &c., they are made of a great variety of sizes and qualities. The largest stones, for grinding saws, scythes, axes, &c., and for heavy work in machine shops, weigh from 2 to 3 tons, and often exceed 7 feet in diameter. They are imported from England, Scotland, Sweden, France, and Nova Scotia. Good stones are also procured in Ohio, and in Michigan on the shores of Lake Huron. The layers of the rock in the quarry furnish them of suitable thickness without side-dressing. They are then roughly shaped in circular form and sent to market. They are mounted where they are to be used, and great care is required to trim and hang them to run smoothly. Large stones are sometimes burst by rapidly revolving and by the strain from the wedging which secures them to their axes, the fragments being driven off with great violence and danger to life and property.

**GRINNELL LAND**, a tract of land in the Arctic ocean, separated from Washington Land by Kennedy channel. Its discovery has been claimed by both English and American explorers. It was seen by the first American Grinnell expedition in search of Sir John Franklin, under Lieut. De Haven, while in lat.  $75^{\circ} 24' 21''$  N., Sept. 22, 1850, and 8 months later was visited by Capt. Penny in the British vessel *Lady Franklin*. This officer, ignorant of its previous discovery, gave it the name of Prince Albert Land. Dr. Kane, on his second expedition in 1854, explored and mapped it toward the W. and N., in long.  $76^{\circ}$  W., and as far N. as lat.  $82^{\circ} 30'$ —the nearest point to the pole yet discovered. An open polar sea, wholly free from ice, abounding in animal life, and separated from the nearest southern land by a solid ice belt 125 m. wide, beats against its coasts, which trend in a W. and N. W. direction, while in the distance a chain of mountains rises above the clouds.

**GRIGUAS**, or **BAASTAARDS**, a mixed race of S. Africa, consisting of the progeny of Dutch settlers by Hottentot and Bush women. They occupy the right bank of the great bend of Gariep or Orange river, on the N. frontier of Cape Colony, and are supposed to number about 15,000 souls, many hundreds of whom have been converted to Christianity and partly civilized. They have a prosperous community at Griqua Town, 580 m. N. E. of Cape Town, under the direction of the London missionary society. This place was the seat of a well known Christian chief named Wateboer, who managed during his reign of 30 years (about 1814-44) to break up the marauding practices for which his people had formerly been noted, though in other Griqua tribes dishonesty was as prevalent as among the Caffres. The chiefs are elected, and their rule is not despotic. The people bear evident marks of their mixed parentage, retaining many of the characteristics of both African and European progenitors. Half breeds of the first generation consider

themselves superior to those of the second. The uncivilized Griquas wear little or no dress. A mantle of sheep or antelope skin thrown over the shoulders is common to both sexes, beside which the women wear an apron of leather strings and the men one of skin, 4 or 5 inches in diameter. They smear their bodies with fat and ochre, and anoint their hair with grease, mixed with pounded blue mica schist. The Christians of this race are generally well clad. Many of them are thriving agriculturists and cattle breeders. A mixture of Griquas and Hottentots, many of whom are discharged soldiers, inhabit the Caffre frontier and the banks of Kat river in the district of Somerset, where they form a sort of military colony.

**GRISCOM**, JOHN, LL.D., an American educator, born at Hancock's Bridge, Salem co., N. J., Sept. 27, 1774, died in Burlington, N. J., Feb. 26, 1852. He belonged to a family of Friends, and passed his childhood in the usual employments of a farmer's son, attending school a part of the time in the neighboring log seminaries. At the age of 17 he began to teach a small school, laboring at the same time several hours daily on the farm, and his success led him to regard teaching as the probable business of his life. After pursuing his studies at the Friends' academy in Philadelphia, established by William Penn, he took charge of the Friends' monthly meeting school in Burlington, with which he was connected 18 years; beginning with 3 scholars, he reared a great institution, which attracted students from Philadelphia, New York, and even New England. He had always been a diligent reader, especially of the English classics, and he now formed a club which subscribed for the principal British periodicals. Chemistry was also a favorite study, and after mastering the works of Lavoisier and Henry, and obtaining the apparatus for experiments, he delivered a course of public lectures on it in his school room in 1806. In 1807 he removed to New York, and began there a career of 25 years as a teacher. In connection with his school he renewed his lectures on chemistry, erected in 1808 a building at once for a school room and lecture room, and his course in the following winter was attended by an audience superior to any that had before assembled for a like purpose in New York. The leading teachers and medical professors of the city were present. His annual vacations he was accustomed to spend in excursions, sometimes to remote parts of the country. In 1818-19 he travelled extensively in Europe, and visited the principal savants and philanthropists, the prisons, manufactories, and institutions of learning and charity, of which he published interesting notices in his work entitled "A Year in Europe" (2 vols., New York, 1823). Prior to his departure he had taken a prominent part in the formation of the society for the prevention of pauperism (1817), of which he prepared the constitution and the elaborate first report on the causes and remedies of pauperism, which was widely disseminated. From this society

proceeded the efforts for the reform of the penitentiary system, and for the erection of separate prisons for juvenile offenders, which resulted in the establishment in 1824 of the New York house of refuge, which is the parent of all the reform schools in the United States. Mr. Griscom was for 6 years the secretary of the society, the author of many of its reports and appeals, one of the managers of the institution after its establishment, and the author of at least 4 of its annual reports. Another of his projects was the New York high school, which adopted the monitorial or Lancasterian system of instruction, and was in successful operation from 1825 to 1831, having at one time 650 scholars connected with it. It was under his general supervision, and he also lectured before all the departments and examined the higher classes, and its reputation was such as to attract visitors from most parts of the country. During the operation of the high school he was chosen professor of chemistry in Rutgers medical college, formed by the secession of 4 prominent professors from the state medical school, which was under the direction of the regents of the university. The new institution soon surpassed the old one in the number of its students, and was in a highly flourishing condition, when it was brought to an end by the legislation of the state, which invalidated its degrees. He delivered a course of lectures on natural philosophy before the mercantile library association in the winter of 1829-'30. In 1832 he became literary principal of a boarding school of the society of Friends at Providence, R. I., where he gave also regular courses of lectures on chemistry and natural philosophy. He resigned this station after 2½ years, and removed successively to West Haverford, Penn., where he lived with his married daughters, and to Burlington, N. J., where he passed the remainder of his life, lecturing frequently for several years on scientific subjects. One of his lectures on geology he had previously delivered in New York and Philadelphia. He passed his latter years in various reading, and in discharge of his duties as town superintendent and trustee of the public schools of Burlington, in which office he reorganized the common school system of New Jersey. In 1847 his name was placed at the head of the list of 8 distinguished educators to whom Horace Mann referred the emendations which he contemplated in the school system of Massachusetts. Dr. Francis, who was his colleague in Rutgers medical college, states that "for 30 years Dr. Griscom was the acknowledged head of all other teachers of chemistry among us," and that he "kept pace with the flood of light which Davy, Murray, Gay-Lussac, and Thénard and others shed on the progress of chemical philosophy at that day. His calm spirit, his deliberate and grave utterance, his exact diction, the simplicity of his manner, and his unostentatious life, were the characteristics which marked him." His memoir, by his son John H. Griscom, M.D., was published in New

York in 1859.—JOHN HOSKINS, son of the preceding, an American physician, born in New York, Aug. 14, 1809. He studied medicine under Professors J. D. Godman and Valentine Mott, and was graduated at the university of Pennsylvania in 1832, his inaugural thesis being published at the request of the faculty. He immediately became resident physician of the New York hospital, was professor of chemistry in the New York college of pharmacy from 1836 to 1840, and was appointed visiting physician of the New York hospital in 1843, which office he still holds. From 1848 to 1851 he was general agent of the commissioners of emigration. Among his publications are a treatise on "Animal Mechanism and Physiology" (New York, 1839); "Sanitary Condition of the Laboring Classes of New York;" "Uses and Abuses of Air, and the Means for the Ventilation of Buildings" (1850); an oration before the academy of medicine in 1834; a memoir of his father (1859); and several occasional letters and documents on matters pertaining to the public health.

GRISEBACH, AUGUST HEINRICH RUDOLF, a German botanist, born in Hanover in 1814, published an account of his travels in Turkey (*Reise durch Rumelien und nach Brusa*, Göttingen, 1841), and has officiated since 1847 as professor of botany in the university of Göttingen. In 1851 he published *Systematische Untersuchungen über die Vegetation der Karaien*, and is the author of a *Lehrbuch der systematischen Botanik*, and of other works.

GRISI, GIULIA, an Italian singer, born in Milan on the feast of St. Giulia in 1812. She is the daughter of Gaetano Grisi, an officer of engineers, and niece of the celebrated singer Grassini, and her musical education seems to have been confined to a few lessons in singing and the occasional instructions of an elder sister, Giuditta, a leading prima donna in Italy. Her quick apprehension, industry, and ambition for musical distinction rapidly developed her powers, and upon her début in Bologna at the age of 17 she made a great impression by the grace and loveliness of her person, her intelligence, and fine vocal abilities. In 1832 she took the part of Adalgisa on the first representation of Bellini's *Norma* at Milan, and shared with Pasta, who personated Norma, the triumph of the occasion. She had previously entered into a contract with Lanari, the *imprésario* at Florence, to sing for him for 6 years at a very moderate salary; but finding that her talents could command a higher remuneration elsewhere, she did not scruple to attempt a hurried and secret journey to France in order to avoid her obligations. After a narrow escape from her pursuers, she crossed the Italian frontier and arrived in Paris, where, through the influence of Rossini, she was engaged as prima donna of the Italian opera. Her first Parisian season was brilliant beyond expectation, and in 1834 her début in London proved no less successful. From that time to the present she has occupied a position on the lyric stage as a great dramatic

singer, second to that of none of her contemporaries. The part of Norma she has so completely identified with herself, that few singers attempt it without borrowing to a considerable degree her expression and action. Her magnificent personation of this part earned for her the name of the *dica*, which she has always retained. In the parts of Semiramide, Lucrezia Borgia, and Elvira in the *Puritani*, the latter of which was written for her, she has shown dramatic capacities which render her scarcely less attractive as an actress than as a singer; while in the buffo music of *Il barbiere di Siviglia*, *Don Pasquale*, or *Cenerentola*, she has been almost equally successful. In Aug. 1854, in company with Signor Mario, she visited the United States, singing in the principal cities, and returned to England in the early part of the succeeding year. In 1836 she was married in London to M. de Meley, a French gentleman. The marriage was unhappy, and Madame Gris has for many years past been living with Mario, by whom she has a number of children.

GRISONS (Ger. *Graubünden*), the easternmost of the Swiss cantons, having N. the cantons of Glarus and St. Gall, the principality of Liechtenstein, and the Tyrol, E. the Tyrol, S. E. and S. Lombardy, S. W. the canton of Ticino, and W. the canton of Uri; greatest length 90 m., greatest breadth 52 m.; area, 2,629 sq. m.; pop. in 1850, 89,895, of whom 51,855 were Protestants. The whole canton is an alternation of valleys and mountains, several of the latter of which reach an elevation of more than 9,000 feet above the sea. The scenery is surpassingly grand. The climate is more diversified than is usual even in Switzerland. While on the mountains winter reigns for more than half the year, the air of the vale below is almost as mild and genial as that of Italy. In the loftier districts the snow sometimes continues as late as July, but in the valleys which look toward the south cultivation can commence as early as the beginning of March. The principal productions are rye, barley, oats, timber, hemp, flax, potatoes, fruit, wine, cheese, and cattle; the rearing of the last constitutes the great business of the inhabitants. Iron, lead, and zinc are produced, but are not extensively mined. There are no manufactures of importance, but a considerable transit trade is carried on through the canton between Italy and Germany. The principal rivers are the sources of the Rhine and Inn, and several tributaries of the upper Adige, Po, and Adda. The canton is divided into 8 leagues—the *Graubund* (league of counts, or gray league), *Gotteshausbund* (league of God's house), and *Zehngerichtenbund* (league of ten jurisdictions), which are governed by their respective presidents and by a general diet of deputies from each *Bund*. They are subdivided into communes, each of which is almost independent within its own limits. Capital, Chur, or Coire. The Romanish language is spoken by about 50,000 of the inhabitants, German by 30,000, and Italian by 9,000. The name of the canton is

said by some to be derived from the color of the dress worn by a band of the people who in 1424 met in a forest near Trons and bound themselves to defend each other against their feudal lords.

GRISWOLD, ALEXANDER VIETS, D.D., a bishop of the Protestant Episcopal church in the United States, born in Simsbury, Hartford co., Conn., April 22, 1766, died in Boston, Mass., Feb. 15, 1848. On his father's side he was descended from respectable English ancestors, who emigrated to America about a century before his birth; his mother's family came from Holland early in the 18th century, and Alexander Viets, his great-grandfather, was a Dutch physician of wealth and standing in New York. Young Griswold enjoyed superior advantages in the care and instruction of his uncle, the Rev. Roger Viets, rector of the Episcopal church in Simsbury; and being remarkable for quickness of perception, he was at an early age well grounded in the classics and mathematics, to the latter of which he always retained a marked attachment. Mr. Viets, his uncle, taking sides with the royalists in the great political struggles of the revolution, determined to leave the United States, and endeavored to persuade Mr. Griswold to accompany him to Nova Scotia; but, though inclined to do so, he was induced to refuse because engaged to a young woman in the neighborhood, named Elizabeth Mitchelson, to whom he was married in 1785. Although desiring to take orders, various circumstances led him to hesitate for a number of years whether to devote himself to the law or the church. After many difficulties he became a candidate for orders in June, 1794, was ordained deacon, June 3, 1795, and priest early in October of the same year, by Bishop Seabury. Mr. Griswold's field of labor was large, including East Plymouth, Harwinton, and Northfield. For 6 years or more he resided at Plymouth, and the following 8 years at Harwinton, compelled to labor as a teacher and farmer in order to eke out a support for his large and growing family. To use Mr. Griswold's own words: "No years of my life have been more happy than the 10 which I passed in those 8 parishes. The people were mostly religious, and all comparatively free from vice. To me and mine they were exceedingly kind. With no one had I ever any manner of contention or unkind dispute; nor did I learn that any one was ever opposed to me. My parishes all gradually increased; and when I left them, I had about 220 communicants, the greater part of whom had first come to the Lord's table under my ministry." Having visited Bristol, R. I., in 1808, he officiated in the vacant parish for two Sundays, which led to his being invited to remove thither; but he declined. The call was repeated very urgently the next year, and in May, 1804, Mr. Griswold accepted it. The church flourished under his rectorship; but he still felt obliged to add to his means of support by teaching a select school. In 1809 he was dangerously ill, but having recovered, he thought of

returning to Connecticut and lightening some of his labors; this was, however, quite unexpectedly to himself, prevented by his elevation soon after to the episcopate. A new diocese had been formed, called the eastern diocese, consisting of the states of Massachusetts, Rhode Island, New Hampshire, and Vermont, and at the convention held at Boston, May 29, 1810, Dr. Griswold was elected the bishop. At first he positively declined, deeming himself not qualified for that high office; but the urgency of his brethren prevailed, and he consented to undertake its duties. He was consecrated at the same time with Dr. Hobart, in Trinity church, New York, May 29, 1811, by Bishop White, assisted by the bishops of New York and Connecticut. Several efforts were made to have Bishop Griswold established in or near Boston, especially at Salem or Cambridge, but without success. He remained as rector of the church in Bristol until 1830, when he accepted a call to Salem, and held the rectorship of St. Peter's until 1835. On the death of Bishop White, in 1836, he became presiding bishop. His episcopal duties were numerous and severe, and in time they began to tell upon his physical vigor. He proposed to the convention to elect an assistant, which was done in June, 1838, by the choice of the Rev. Alonzo Potter, D.D. Dr. Potter, however, declined the appointment. In Nov. 1842, the Rev. Manton Eastburn, D.D., was chosen, and Bishop Griswold's last act was the consecration of Dr. Eastburn in Trinity church, Boston, Dec. 29, 1842. The venerable bishop, though advanced in years, and suffering from infirmity, labored on to the last, his zeal and devotion to his duties unabated. On Wednesday, Feb. 15, 1843, he set out from his house to call on Bishop Eastburn, when just as he reached the door he fell to the ground, and expired a few moments after he was lifted up. Bishop Griswold was the author of several occasional sermons and addresses, which were marked by his usual good sense and sound scriptural views. He had 14 children, and one of his sons became an Episcopal clergyman, but died before his father; only one son survived him. In personal appearance and manners, he was distinguished for gravity and dignity, and his gentleness, modesty, and kindness everywhere obtained respect. Though warmly attached on conviction to the Episcopal church, he never pushed his views or opinions to an extreme; he was highly esteemed by Christians of other denominations; and his mild firmness and decision rendered him excellently adapted to uphold and set forth the cause of the church in that part of our country where, for many reasons, it was looked upon with little favor.—A life of Bishop Griswold has been written by the Rev. J. S. Stone, D.D.

GRISWOLD, ROGER, governor of Connecticut, born in Lyme, Conn., May 21, 1762, died there, Oct. 25, 1812. He was graduated at Yale college in 1780, and afterward studied and entered on the practice of law. In 1794 he

was chosen a member of congress by the federal party, and in 1801 was offered by President Adams the appointment of secretary of war, but declined it. He was appointed judge of the supreme court of Connecticut in 1807, and elected lieutenant-governor in 1809, which post he held until he was chosen governor in 1811. Having been required by President Jefferson to place 4 companies of the Connecticut militia under Gen. Dearborn for garrison duty, he refused on the ground that the order was unconstitutional, as they were not needed "to repel invasion."

GRISWOLD, RUFUS WILMOT, an American author, born in Benson, Rutland co., Vt., Feb. 15, 1815, died in New York, Aug. 27, 1857. He was apprenticed to the printing trade, which he followed for some time, and afterward studied divinity and became a preacher in the Baptist church. He soon became associated in the editorship of literary periodicals in Boston, New York, and Philadelphia, among which were the "New Yorker," "Brother Jonathan," and the "New World." In 1841 he published a volume of poems and one of sermons, the former anonymously. In 1843 and 1848 he edited "Graham's Magazine," in Philadelphia, to which he attracted contributions from some of the best writers in the country, and in 1850 he projected the "International Magazine," published in New York, and edited by him till April, 1852. The works by which he is chiefly known are collections of specimens from American authors, accompanied by memoirs and critical remarks, and forming together a history of American literature. The first of these was the "Poets and Poetry of America" (Philadelphia, 1842; 17th ed. 1856). It was followed by the "Prose Writers of America" (Philadelphia, 1846; 4th ed. 1856), and by the "Female Poets of America" (Philadelphia, 1849; 5th ed. 1857). After the publication of the last, the "Poets and Poetry of America" was reconstructed (in the 11th ed.), all memoirs and specimens of female poets being omitted from it. Mr. Griswold also edited the "Sacred Poets of England and America" (1849), and the "Poets and Poetry of England in the Nineteenth Century" (4th ed. 1854). His other principal publications are the "Curiosities of American Literature," published as an appendix to Disraeli's "Curiosities of Literature;" two series of biographies, "Washington and the Generals of the American Revolution," in conjunction with W. G. Simms, E. D. Ingraham, and others (3 vols., 1847), and "Napoleon and the Marshals of the Empire," in conjunction with H. B. Wallace (3 vols., 1847); and a richly illustrated volume, entitled the "Republican Court, or American Society in the Days of Washington" (New York, 1854). He also edited the first American edition of the prose works of Milton (1845), and was one of the editors of the works of Edgar A. Poe.

GRIT, a name given to a variety of hard sandstones, as the millstone grit, which is the conglomerate formation of silicious sand and

pebbles that lies at the base of the coal measures, both in the United States and in Europe. The hard sandstone of the Shawangunk mountain in New York is often known as the Shawangunk grit. In England the name is sometimes applied to calcareous conglomerates.

GRITTI, ANDREA, 78th doge of Venice, born in 1454, died Dec. 28, 1538. During the war against the league of Cambrai he led the armies of the republic against the imperialists, whom he at first defeated. In 1512 he regained Brescia and Bergamo from the French, but was shortly after defeated and made prisoner by Gaston de Foix, who took him to Paris. During his imprisonment he succeeded in forming an alliance between France and the Venetian republic, and on his return to Venice he coöperated with French troops in driving the imperialists out of Brescia and overrunning the kingdom of Naples. On May 7, 1523, he was elected doge, and filled that office until his death.—LUIER, an adventurer in the service of the Turks, son of the preceding by a Turkish slave, born in Constantinople in 1501, while his father was ambassador there, died in Transylvania, Sept. 28, 1584. He was educated at Padua, but finding no honorable employment open to him in Italy, he repaired to Constantinople, ingratiated himself with the grand vizier, and became a favorite with Solyman II., who intrusted him with diplomatic missions to various nations. He persuaded his master to support the pretensions of John Zapolya to the throne of Hungary, and took part in the attack on Vienna in 1529. After the coronation of Zapolya at Buda, Gritti was appointed governor-general of Hungary, but abused the power committed to him by a bloody persecution of his enemies. The murder of the vicar of the bishopric of Grosswardein and governor of Transylvania finally aroused the indignation of the people of that province, who marched against him with an overpowering force, besieged him in Mediasch, and put him to death.

GROAT (Dan. *groot*, Ger. *gross*, great), an old English silver coin, of the value of 4 pence (originally about equal to the present shilling), first struck under Edward III. about 1351, and so named because it was the greatest silver coin then in use, none having been previously struck of value over a penny. The *grot*, *groot*, and *Groschen* are silver coins or moneys of account on the continent of Europe.

GROATS, or GRITS, oats deprived of their husks, and cut or bruised in the mill. They are esteemed by the Scotch as nourishing food, and are admitted into the pharmacopoeia of the London college. They are used for a nutritious, easily digested, and laxative gruel. The meal is sometimes administered in the form of an enema, and applied as a poultice. In the United States, by the term grits is understood cracked wheat, which, containing the bran of the grain, is a more nutritious and easily digested food than the bolted flour.

GROCYN, WILLIAM, a learned Englishman,

and one of the revivers of Greek literature, born in Bristol in 1442, died in Maidstone in 1519. He was educated at Oxford, and subsequently went to Italy and studied Greek under Demetrius Chalcondyles and Politian. On returning to England he delivered lectures at Oxford on Greek, and was the teacher of Erasmus. He is said to have written nothing save a Latin epistle to Aldus Manutius, which Linacre published with his translation of *Proclus de Sphæra*.

GRODNO, a government of European Russia, in Lithuania, formerly a part of Poland, bounded N. by the government of Wilna, E. by Minsk, S. by Volhynia, and W. by Poland; length 270 m., breadth 230 m.; area, 14,700 sq. m.; pop. in 1851, 795,604. The surface is generally level, and a great portion of it is covered with pine forests and swamps. The climate is very severe in winter. The principal agricultural productions are rye, barley, timber, hops, hemp, flax, fruit, honey, and cattle. The most important minerals are iron, chalk, limestone, and nitre. The forests abound with wild boars, wolves, bears, elks, and roebucks. The manufactures consist for the most part of woollen stuffs, hats, and leather. The chief rivers are the Niemen, Bug, Narew, and Pripetz. This government is divided into 8 circles. The principal towns are Grodno, Novogrodek, and Slonim. Capital, Grodno, on the right bank of the Niemen, 210 m. N. E. of Warsaw; pop. 17,000. Its chief manufactures are woollens, silk stuffs, linen, hats, and fire-arms.

GRONINGEN, a N. E. province of Holland, bounded N. and N. E. by the German ocean and the estuary of the Ems, E. by Hanover, S. and S. W. by the province of Drenthe, and W. by Friesland; greatest length 50 m., greatest breadth 34 m.; area, 883 sq. m.; pop. in 1858, 207,318. The surface is generally level, and in some places marshy. The climate is humid and unhealthy. The soil is very fertile, and is watered by numerous rivers and canals. The productions are corn, potatoes, butter, cheese, coal, flax seed, honey, wool, seeds, fruits, pigs, and cattle, which form the great exports from the province. It is divided into 3 arrondissements, Groningen, Winschotten, and Appingadam. Capital, Groningen, at the junction of the Aa and the Hunse, 92 m. N. E. of Amsterdam; pop. 85,670. The streets are traversed by canals, bordered with trees and crossed by 18 bridges. The principal public edifice is the province house, a large Gothic structure completed in 1810. About 600 vessels arrive at and leave the port annually.

GRONOVIVS, the Latinized appellation of a German family, Gronov, who settled in Holland, and produced several classical scholars in the 17th and 18th centuries.—JOHN FREDERIC, son of a syndic of Bremen, born in Hamburg, Sept. 10, 1611, died in Leyden, where he filled the chair of belles-lettres, Dec. 28, 1671. He published annotated editions of Livy, Sallust, Seneca, Pliny, &c., beside numerous essays on philology and antiquities.—JACOBUS, his eldest son, born in Deventer, Holland, Oct. 20, 1645,



died in Leyden, Oct. 21, 1718, published editions of Herodotus, Polybius, Macrobius, Aulus Gellius, and Tacitus, but is best known by his *Thesaurus Antiquitatum Græcarum* (18 vols. fol., Leyden, 1697).—LAURENTIUS THEOPHILUS, brother of the preceding, was also distinguished as an antiquary and polemic, but died young. He published *Emendationes Pandectarum juxta Florentinum Exemplar* (Leyden, 1685).—ABRAHAM, eldest son of Jacobus, born in 1694, died in Leyden in 1765, was by profession a physician. Of his works may be mentioned *Varia Geographica* (Leyden, 1739), also an annotated version of Justin (1760).—JOHN FREDERIC 2d, his brother, was a botanist, and friend of Linnaeus. He died in 1760. Sir Joseph Banks purchased his herbarium.—LAURENTIUS THEOPHILUS 2d, son of the preceding, was also a naturalist. He published *Museum Ichthyologicum*, and died in 1778.

GROOT, GERHARD, or GERARD THE GREAT, founder of the congregation of "Brethren and Clerks of the Common Life," born in Deventer, Holland, in 1340, died Aug. 20, 1384. He studied at the university of Paris, was graduated master of arts at the age of 18, and then taught philosophy and theology at Cologne, where his eloquence and learning gained him the surname of Magnus. Although not in priestly orders, he held several rich benefices, beside a considerable patrimony, and lived for some years in great luxury, until an interview with the prior of a Carthusian monastery in Geldern induced him to forsake the world and enter the religious state. He renounced his benefices, and after 3 years' retirement was ordained deacon, his humility making him refuse higher advancement. He now passed through the principal cities of the diocese of Utrecht, preaching with extraordinary effect to immense audiences, and working reforms no less among the clergy than among the laity. So violent however was the opposition which he encountered, that he was forced to engage a notary to travel with him in order to draw up complaints against those who hindered him. He assailed the empty disputes of the scholastic theologians; he taught that the reading of the Scriptures and of the writings of the fathers should be one of the chief occupations of a Christian; and for the sake of those who could not read Latin he translated the Psalms and the church office into Dutch. Having collected from various monasteries some of the best manuscript copies of the Bible and the fathers, he established in his own house at Deventer a society of persons whose principal employment was to be the transcribing of these books. He gave them a rule of life, prescribed community of goods, and placed over them one Florent Radewyn, professor in the university of Prague, a rich man who had been converted by Gerhard's preaching. The "Brethren and Clerks of the Common Life," as the associates were called, became immensely popular. In a short time they counted 100 separate communities, among

which there were some of women. The mendicant orders, jealous of their prosperity, sought to identify them with the Beguins, and charged them with falling under the class of societies forbidden by the popes; but Gerhard defended himself with great skill, and obtained the formal sanction of Gregory XI. in 1376. The approbation of the council of Constance was afterward secured by Gerson. Gerhard was also attacked by the brethren of the free spirit, one of whom called Bartholomew preached against him at Campen with such bitterness that Gerhard procured his condemnation by the bishop of Utrecht. The magistrates of Campen, enraged at this sentence, drove all the brethren of the common life out of their town. Gerhard next visited the famous mystic reformer Ruysbroeck, whose doctrines are said to have greatly resembled his own, and was so struck by his unostentatious austerity of life, that he resolved to increase the severity of his own rule. Three years after this he died of a pestilence contracted in visiting a sick person. He left a number of ascetic works, one or two of which have been published. The order flourished after his death, and some of the first printers were members of it. (See BRETHREN AND CLERKS OF THE COMMON LIFE.)

GROS, ANTOINE JEAN, baron, a French painter, born in Paris, March 16, 1771, drowned in the Seine near Meudon, June 25, 1835. He was educated in the school of David. "Bonaparte on the Bridge of Arcole," painted in 1801, first brought him into notice; but the "Plague at Jaffa," with Napoleon visiting the sick, exhibited in 1806, excited an extraordinary enthusiasm. The artist was placed at the head of living painters, and his picture was crowned with wreaths of palm. Gros next painted in rapid succession, and in a similar manner, immense pictures of the "Battle of Aboukir," the "Battle of the Pyramids," "Napoleon visiting the Field of Eylau after the Battle," the "Battle of Wagram," and other subjects suggested by the eventful era of the first empire. In France his chief work is considered to be the cupola of St. Geneviève at Paris, exhibiting the saint protecting the throne of France, represented by Clovis, Charlemagne, St. Louis, and Louis XVIII. The picture covers an immense space, and is correct in design, but defective in color and expression. The artist received for it 150,000 francs, and the title of baron. Toward the close of his life his style deteriorated so greatly that his pictures became the objects of very severe criticism. He made a last attempt to compete with the new romantic school in his "Hercules and Diomedes;" failing in which he closed his studio, exclaiming "that he knew no misfortune greater than to survive oneself." Soon after, in a fit of temporary insanity, as has been supposed, he drowned himself in the Seine.

GROSBEAK, the name of many conirostral birds of the finch family, and sub-family *cothraustina*, or hawfinches, found in all parts of the world. One of the handsomest of the

American species is the pine grosbeak (*pinicola Canadensis*, Briss.), classed by Gray among the bullfinches. In this genus the bill is short, stout, and much curved, and the base of the upper mandible nearly concealed by bristly feathers; the wings moderate, the 2d and 8d quills the longest; the tail shorter than the wings, broad and nearly even; tarsi as long as the middle toe, strongly scutellated, and the claws long and sharp. The length of the pine grosbeak is 8½ inches, and the extent of wings 14; the bill and legs are black; the general color of the soft and full plumage is bright carmine, with grayish brown centres to the feathers of the back; the loreal region, lower jaw, sides, and lower parts, light gray; wings blackish brown, with 2 white bands, the outer edges of the quills also white. The female is ash-gray and brownish above, with yellow tinges below, and on the head, rump, and upper tail coverts; the young resemble the female, but are browner. This bird inhabits arctic America, coming as far south as Pennsylvania in severe winters. It is a charming songster, singing toward sunset, and in captivity during the night; it is easily kept in cages, and will eat most kinds of seeds, berries, and fruits, becoming very familiar; in its wild state it feeds on the buds and seeds of various trees, especially of the fir. The flight is undulating and direct, and they alight on the topmost branches, from which they gradually descend; they are not shy, and are easily approached, especially while bathing, of which they are very fond. They are subject to sores and excrescences on the tarsi, produced, according to Audubon, by the contact of resinous substances; these frequently destroy life. The nest is made of sticks, at a small distance from the ground, and lined with feathers; the eggs are generally 4, and of a white color. Other species are found in the pine forests of Europe and Asia; the *P. enucleator* (Linn.) of Europe is smaller, with a less stout bill, narrower tail, and less white on the wings.—The evening grosbeak (*esperiphona vespertina*, Cooper) is characterized by an enormous vaulted bill, of a greenish yellow color, much curved at the tip; the wings are long and pointed; the tail short, and its feathers narrow; the length is 8 inches. The anterior half of the body is yellowish olive; outer scapulars, band over eye, axillaries, and middle under wing coverts, yellow; crown, tibia, wings, upper tail coverts, and tail, black. It is found in the north-west as far east as Sault Ste. Marie, and on the Pacific coast, especially about the Columbia river; from its abundance in the northern maple groves, it is called by the Indians sugar bird. The habits are those of the preceding species; they are noisy all day, and not in the evening only, as their name would indicate; their notes are harsh and screaming. The females have the head and back brownish, with yellowish ash rump, upper tail coverts spotted with white, and less white on the wings.—The rose-breasted grosbeak (*guiraca ludoviciana*, Linn.) has a very thick,

slightly arched bill, pointed wings longer than the even tail, and the tarsi shorter than the middle toe. The length is 8½ inches; the general color above is glossy black, with the breast, axillaries, and under wing coverts carmine; the rest of lower parts, rump, upper tail coverts, middle wing coverts, spots on the wings, base of primaries and secondaries, and patch on the end of the inner webs of the outer 8 tail feathers, pure white. The female is brownish above, with yellowish marks and tinges. Its song is soft, clear, and sweet, and in captivity prolonged into the night. It is found in the eastern states, as far west as Missouri, and south to Guatemala; it feeds on young and tender buds and seeds, and is very fond of the berries of the sour gum tree.—The black-headed grosbeak (*G. melanocephala*, Swains.) is about 8 inches long; the bill is strong and blackish; the general color is black, with a median band on the crown; nuchal collar, rump, and under parts yellowish cinnamon, and the central line of the belly yellow. In the female the under wing coverts are lemon yellow, while in the female of the rose-breasted species they are orange yellow. It is found on the high central plains from Yellowstone river to the Pacific, and on the table-lands of Mexico. According to Nuttall, this bird frequents the thick woods, where it is rarely seen, but often heard from early dawn till into the night; he says its voice "is a loud, varied, high-toned, and melodious fife, which rises and falls in the sweetest cadence; but always, like the song of the nightingale, leaves a sensation of pleasing sadness on the ear, which fascinates more powerfully than the most cheering hilarity."—The blue grosbeak (*G. carulea*, Linn.) is 7½ inches long, and is of a general brilliant blue color, with wings banded with chestnut brown, and space around bill and tail feathers black. The female is yellow and brownish, with a faint trace of blue on the crown. It is found in the southern states, and across the continent to the Pacific coast.—The cardinal grosbeak (*cardinalis Virginianus*, Briss.) has a very large bill, moderate wings, and a graduated tail longer than the wings; the length is 8½ inches; the bill red; the crown surmounted by a flattened erectile crest, about an inch long; the general color bright vermilion red, darkest on the back, rump, and tail; a narrow band around the base of the bill, the chin, and upper part of the throat, black. The female is light olive above, with a yellowish tinge on the head, and brownish yellow below and on the sides; the tail, wings, and crest have a dull red color. It is found in the southern states, as far as Missouri, and probably along the Rio Grande to the Rocky mountains. This is one of our most highly prized cage birds, on account of its color, vivacity, strength and variety of song, and ease of keeping; numbers have been carried to Europe, and in England they are called Virginia nightingales, a name to which Latham says they are fully entitled from the clearness and excellence of their notes;

they sing from March to September, and are said by Wilson to be most lively in wet weather; they are often called red birds. The males when confined together fight violently, and will try to attack their own images reflected in a mirror; the females are often nearly as good singers as the males. Their food consists chiefly of maize, and the seeds of various kinds of fruits; they are said to destroy bees. There are other species of these beautiful songsters in the northern parts of South and in Central America. The nests are made of twigs, weeds, and vines, lined with finer materials, and are placed in a holly or laurel bush; the eggs are 4, of a dull white color, with numerous markings of brownish olive.

GROSE, FRANÇOIS, an English antiquary, born in Greenford, Middlesex, in 1731, died in Dublin, May 6, 1791. His first work, entitled "Views of Antiquities in England and Wales," came out in numbers, and was completed in 1787. In 1789 he went to Scotland, intending to illustrate the antiquities of that kingdom as he had those of England and Wales. The first number of his work on this subject made its appearance in 1790. While in Scotland he became acquainted with Burns, who afterward celebrated his convivial qualities in two ballads. Grose had few of the qualifications of an antiquary, but produced a number of works beside those above mentioned, the chief of which are: "Guide to Health, Beauty, Riches, and Honor" (8vo., London, 1788); "Classical Dictionary of the Vulgar Tongue" (8vo., 1785); "Treatise on Ancient Armor and Weapons" (4to., 1786); "Provincial Glossary," &c. (8vo., 1787); "Military Antiquities" (2 vols. 4to., 1786-'8); "Rules for Drawing Caricatures" (8vo., 1788).

GROSS, SAMUEL D., M.D., an American physician and surgeon, born in Northampton co., Penn., in July, 1805. He received his degree of M.D. in 1828, and began the practice of medicine in Philadelphia, devoting his leisure to study and to the translation of French and German medical works, as Hollard's "General Anatomy," Hatin's "Manual of Obstetrics," Hildenbrand on "Typhus Fever," and Tavernier's "Operative Surgery." His first original work was a treatise on the "Diseases and Injuries of the Bones and Joints" (1830). In this work occurs the first account of the use of adhesive plaster as a means of extension in the treatment of fractures. In 1830 he removed to Easton, but being offered the post of demonstrator of anatomy in the medical college of Ohio, he went to Cincinnati in the autumn of 1833. In 1835 he accepted the professorship of pathological anatomy in the medical department of the Cincinnati college, where he delivered the first systematic course of lectures on morbid anatomy that had ever been given in this country, and composed the first systematic treatise upon the subject ever published in the United States, "Elements of Pathological Anatomy" (2 vols. 8vo., Boston, 1839; 8d ed. 1857). In the autumn of 1840 Dr. Gross removed to Louisville, Ky., having pre-

viously been elected to the chair of surgery in the university of that city. In 1850 he resigned his chair, having accepted the professorship of surgery in the university of New York, rendered vacant by the retirement of Dr. Mott, but withdrew at the end of the session, and returned to Kentucky, where he was soon afterward restored to the chair which he had so recently relinquished. In 1856 he was called to the chair of surgery in the Jefferson medical college of Philadelphia, where he now resides. Beside the works already mentioned, Dr. Gross is the author of a monograph on "Wounds of the Intestines" (1843); "Diseases, Injuries, and Malformations of the Urinary Organs" (1851); "Foreign Bodies in the Air Passages" (1854); "Report on the Causes which retard the Progress of American Medical Literature," read before the American medical association at its meeting in Detroit (1856); "System of Surgery, Pathological, Diagnostic, Therapeutic, and Operative" (2 vols. 8vo., 1859). He has also in preparation a work on American medical biography. In conjunction with Dr. Richardson, he founded and edits the "North American Medico-Chirurgical Review," and has contributed numerous papers to various medical periodicals. He is a member of the American philosophical society, of several of the medical societies of the United States, and of the imperial medical society of Vienna.

GROSS-BEEREN. See BEEREN, GROSS.

GROSSWARDEIN (Hung. *Nagy-Várad*), a town in the county of South Bihar, district of Grosswardein, Hungary, on the Sebes Körös, in a beautiful but somewhat marshy plain; lat. 47° 1' N., long. 21° 54' E.; pop. about 21,000. The peace between John Zápolya and Ferdinand I. was concluded here in 1538.

GROTE, GEORGE, an English historian, born at Clay Hill, near Beckenham, Kent, in 1794. His grandfather, who was descended from German ancestors, in partnership with Mr. George Prescott founded the London banking house of Prescott, Grote, and co. Mr. Grote entered Charterhouse school, London, and in 1809 became a clerk in his father's bank. His leisure hours were given to literature and political studies. He is a liberal in politics, inclining to radicalism, and his first literary production was a reply to an article by Sir James Mackintosh in the "Edinburgh Review" on parliamentary reform. It was published anonymously in pamphlet form in 1821, and he wrote also a small work on the "Essentials of Parliamentary Reform." He studied political economy in the school of Mr. James Mill, and has been influenced in philosophy by the theories of Comte. So early as 1823 he began to collect materials for his history of Greece, intending to treat his subject in a manner more philosophical and thorough than his predecessors Mitford and Gillies. As Mitford was the apologist of the Greek tyrants and oligarchs, Mr. Grote has espoused the cause of the demos. He was drawn away from his literary project by the reform

movements in his native country, and was elected to parliament in 1832 from the city of London. The principal feature of his political career has been an attempt to introduce the method of voting by ballot into the English elections. His motion was defeated in 1833 by a vote of 211 to 106. He renewed the motion the next session, supporting it with vigorous and effective eloquence, but was again unsuccessful. He continued to advocate the measure until the close of his parliamentary service in 1841, when he resigned in order to give his whole attention to his history. While in retirement he contributed to the "Westminster Review" an article on Mitford's "History of Greece," and one to the "London and Westminster Review" on Niebuhr's "Heroic Legends of Greece." In 1846 the first two volumes of his work were printed at London, comprising chiefly the legendary and heroic period of Greece. They were received with general applause from all parties. Two more volumes came out in 1847, the 5th and 6th in 1849, the 7th and 8th in 1850, the 9th and 10th in 1852, the 11th in 1853, and the 12th in 1856, bringing down the subject to the end of the generation contemporary with Alexander, the limit which the author had assigned for it. The work at once rose to a high position in literature, and several editions have been called for. It has also been translated into German. The author begins with a simple presentation of the Grecian legends in their ancient form, without any attempt to weigh their probabilities, or to rationalize them into history. He thinks the authentic records reach back only to the first Olympiad, 776 B. C. This position has been questioned with ardor by Mr. Fynes Clinton, Col. Mure, and others; but Mr. Grote has defended it with great learning and force. Mr. Grote throws upon Greek history new light, and unfolds with clearness the progress of Hellenic thought. His geographical descriptions are also exact. He describes battles with minute accuracy, and is equally successful in painting Socrates disputing in the Agora, in defending the sophists, or in unfolding the bold and generous nature of Demosthenes. His philosophical speculations are sometimes abstruse and above the popular understanding; but his style, strong, bold, and manly, though not always attractive, satisfies the intellect, his novel researches awaken curiosity, and the world at length possesses a history which paints with fidelity and power the inner as well as the external life of Greece.

GROTEFEND, GEORG FRIEDRICH, a German philologist and archæologist, born in Minden, June 9, 1775, died in Hanover, Dec. 15, 1853. He studied in Göttingen, where he became acquainted with Heyne, Tychsen, and Heeren. The former procured an appointment for him as a schoolmaster. He officiated for some time as rector of the gymnasium of Frankfort-on-the-Main, and founded in 1817 the *Gelehrten-Verein für deutsche Sprache*. Afterward he was director of the lyceum of Hanover from

1821 until 1849. He was a contributor to Ersch and Gruber's cyclopædia, wrote on German philology and poetry, and extensively on the ancient languages and the geography of Italy, prepared several Latin grammars for the use of schools, and was the first to question the genuineness of Wagenfeld's alleged discovery of Sanchoniathon's original history of the Phœnicians. He gained a high reputation at home and abroad, chiefly by his successful attempts in deciphering the Pehlevic inscriptions of the Sassanides at Naksh-i-Rustam, near Persepolis, which were published in Heeren's works in 1815, and in English in 1832. In these efforts he was the follower of Sylvestre de Sacy, and his labors were completed and reviewed by Eugène Burnouf, Christian Lassen, E. F. F. Beer, I. Oppert, and others. His principal works on the subject are: *Beiträge zur Erläuterung der Persepolitischen Keilschrift* (Hanover, 1837); *Neue Beiträge zur Erläuterung der Babylonischen Keilschrift* (1840); *Bemerkungen zur Inschrift eines Thongefässes mit Babylonischer Keilschrift* (Göttingen, 1848), and with *Ninivitischer Keilschrift* (1850); *Anlage und Zerstörung der Gebäude zu Nimrud* (1851), &c.

GROTIUS (DE GROOT), HUGO, a learned Dutch jurist and writer, born in Delft, April 10, 1583; died in Rostock, Aug. 28, 1645. In his 9th year he is said to have made extemporaneous Latin verses; and in his 15th he published an edition of Marcianus Capella, from the annotations of which it is evident the young editor must have been critically acquainted with the works of Cicero, Aristotle, Pliny, Euclid, Strabo, Ptolemy, and many other even more recondite authors. After 3 years at the university of Leyden, which he had entered at the age of 12, he was made an attaché to an embassy from the Dutch states to Henry IV., the object of which was to gain the French king to the side of Holland and England against Spain. The ambassador was the celebrated Barneveldt. Grotius was received with marked distinction in France; he was honored by the university of Paris with the degree of doctor of laws, and the king complimented him with a present of his portrait and a gold chain. He returned to Holland in April, 1599, and immediately published a translation of a Latin work by Stevinus on nautical matters. The next year appeared his edition of the *Phænomena* of Aratus, and about the same time he began the practice of law at the Hague. In 1607 he accepted the office of advocate general for the treasury of Holland and Zealand, and shortly afterward was married to the daughter of an opulent family in Zealand. In 1608 he published his treatise upon the freedom of the seas (*Mare Liberum*); and in 1610 a dissertation on the "Antiquity of the Batavian Republic," for which he received the unanimous thanks and compliments of the government. In 1613 he was elected pensionary of Rotterdam for life, and was soon afterward sent to England for the

purpose of effecting an amicable adjustment of a dispute on the subject of fishery in the northern seas. The mission was not successful, and the negotiation was subsequently transferred to commissioners at Rotterdam. Grotius had adopted the principles of Arminius, and soon after his return from England became deeply involved in the religious disputes which now agitated his country. The public peace was violently interrupted through their acrimony; and various events of a short civil war led at length to the arrest of Barneveldt, Grotius, and Hoogarbets. They were tried and condemned, the first to death, and the two others to perpetual imprisonment. Their crime was defence and support of religious toleration. The castle of Loevenstein, on an island formed by the Waal and the Meuse, was selected as the prison of Grotius. So closely was he guarded that his father was denied the privilege of seeing him. His wife, however, at length obtained permission to share his fate; and with her society and in close habits of study, he found his prison by no means an intolerable home. His favorite occupation was theology; and its result was his celebrated annotations on the Gospels. He also wrote in Dutch the foundation of his famous treatise upon the truth of the Christian religion, which, published afterward in Paris in Latin, became the most valued of all his works, and before the close of the 17th century had been translated into English, French, Flemish, German, Persian, Arabic, and Greek. In the introduction to the work the author says that his original purpose was to afford occupation to his countrymen during long voyages in their commercial enterprise, in the hope of thus enabling them, through intelligible and convincing arguments, to become the means of diffusing Christian light among remote and less happy nations. Many modern authors have followed him in his course of reasoning, but the work of Grotius still holds its high place. After nearly 2 years' imprisonment, the escape of Grotius from the castle was happily effected through the wit and address of his wife. It had been her practice to send away and receive books in a chest; and observing that after a time the guards neglected to examine it in its passage to and fro, she caused Grotius to be carried out in it (March 21, 1621). Disguised as a mason with trowel and rule, he escaped to Antwerp. His wife at first was rigorously confined, but upon petition made to the states-general she was soon after liberated. Paris became their place of refuge. The illustrious refugee was well received at the court, and in the course of the year became a French pensioner, with an annuity equivalent to about \$1,500. He immediately published his "Apology," in vindication of his conduct, and attacking the legality of his sentence. The states-general in reply outlawed the author, and forbade the reading of his memorial on pain of death. His personal safety was assured meanwhile by letters of naturalization from Louis

XIII. He retired next to a country seat of the president De Mesmes, near Senlis, and began his great work on the "Rights of Peace and War" (*De Jure Belli et Pacis*). The author remained more than 9 years in France; and at last, through the application of friends and the entreaties of his wife, Frederic Henry, succeeding the incensed Maurice in the stadtholdership, reversed the decree of confiscation of the exile's property. In 1631 Grotius ventured to revisit Holland. Finding no security, however, against renewed persecution, he repaired to Hamburg in March, 1632, and received immediate and pressing invitations from Spain, Portugal, Denmark, and Sweden. Gustavus Adolphus had previously made overtures to him, and upon the death of that monarch, his famous chancellor Oxenstiern, at the head of a Swedish regency during the minority of Christina, prevailed upon Grotius to become Swedish ambassador at the court of France (1635). He filled this post during 10 years at a period of unparalleled responsibility, to the entire satisfaction of the government which he represented. The service, however, on many accounts, was far from agreeable to him. Richelieu's hostility or dissatisfaction was never concealed; but at Oxenstiern's express desire Grotius remained at his post until the majority of Christina. On his visit to Stockholm in June, 1645, he was received with great honor and cordiality. He seems almost immediately, however, to have found Sweden unsuited to his health or disposition, and to have resolved to leave it. Christina, in some pique, refused him a passport for the purpose, whereupon he set forth without one. He was overtaken, and induced to return. Christina however, seeing his resolution, consented now to his retirement, and dismissed him with large presents of money and plate. The vessel in which he embarked was driven in a storm into a port near Dantzic; whence, in the most tempestuous weather, he set forth in an open carriage, but was seized at Rostock by his last illness. Beside the works already mentioned, Grotius left a great number of writings on various subjects, among which are: *Adamus Ezul*, a tragedy (Leyden, 1601); *Christus Patiens*, a tragedy (1608); *Sophompaneas*, a tragedy (1617); *Defensio Fidei Catholicae de Satisfactione Christi adversus F. Socinum* (8vo., 1617); "Introduction to the Jurisprudence of Holland" (4to., the Hague, 1631), in Dutch; *Florum Spatio ad Jus Justinianum* (4to., Paris, 1642); *Via ad Pacem Ecclesiasticam* (8vo., Amsterdam, 1642); *De Origine Gentium Americanarum* (Paris and Amsterdam, 1642), and a second dissertation on the same subject (Paris, 1648); *De Imperio Summarum Potestatum circa Sacra* (4to., 1647); *Historia Gothorum, Vandalorum, et Longobardorum* (8vo., Amsterdam, 1655); *Annales et Historia de Rebus Belgicis* (fol., 1657); *Parallelon Rerum publicarum Libri III.* (8 vols. 8vo., Haarlem, 1801); commentaries on various portions of the Scriptures, Latin poems, and miscellaneous treatises. His letters, after having appear-

ed in several incomplete collections, were published in full at Amsterdam (fol., 1687). They are interesting, and written in excellent Latin. His *Opera Theologica* were published in 1679 (4 vols. fol., Amsterdam, and 8 vols. 4to., London), and his poems in 1617 (8vo., Leyden; 11th ed., Amsterdam, 1670). There are English translations of the most important of his works, including the treatises *De Veritate Religionis Christiana* (by Clement Barksdale, 4th ed., 1667; by Symon Patrick, 12mo., London, 1680; in verse, 8vo., 1686; by Spencer Madan, 8vo., 1782; 12mo., 1821; by Dr. John Clarke, 12mo., 1845), and *De Jure Belli et Pacis* (by C. Barksdale, 8vo., London, 1654; 8vo., 1655; by W. Evans, fol., 1682; 3 vols. 8vo., 1715; fol. with the notes of Barbeyrac, 1738; by the Rev. A. C. Campbell, 8 vols. 8vo., Pontefract, 1814).

GROTON. I. A township of Middlesex co., Mass., on Nashua and Squannacook rivers, 32 m. N. W. from Boston and 13 m. S. W. from Lowell; pop. in 1855, 2,745. It is on the line of 4 railroads which connect at Groton Junction, viz.: the Worcester and Nashua, the Fitchburg, the Stonybrook, and the Peterborough and Shirley. It contains 8 post villages, Groton, South Groton, and West Groton, 6 churches (2 Baptist, 3 Congregational, and 1 Universalist), a newspaper office, and a lyceum, and is the seat of the Lawrence academy, which was incorporated in 1793, and owes a liberal endowment to the munificence of the Lawrence family, who are natives of this place. The academy has a good library, and the building and grounds are valued at about \$20,000. The township is well supplied with water power, and in 1855 had 2 paper mills manufacturing \$168,000 worth of paper per annum, and having a capital of \$32,000; a plough factory, making \$51,308 worth of ploughs, &c., and having a capital of \$25,000; a tin ware factory, and a tannery. There are several grist and saw mills, and shoemaking is becoming a prominent branch of industry. II. A township of New London co., Conn., on Long Island sound, at the E. side of the mouth of Thames river, and opposite the city of New London; pop. in 1850, 3,654. It is on the Stonington and Providence railroad, the principal village being 12 m. W. from Stonington, and 62 m. by rail S. W. from Providence. There is a good harbor, and the town is interested in the coasting trade, ship-building, and the whale fisheries. A considerable export business is carried on with New York. Mystic and Pequonnock rivers flow through the town to Long Island sound, and supply valuable motive power, which is employed in running cotton mills, &c. There are foundries of brass and iron, and manufactories of britannia ware. Groton is the site of Fort Griswold, memorable for the massacre of an American garrison at the time of the destruction of New London and Groton by the British troops under Benedict Arnold, Sept. 6, 1781. The British having captured the fort after a desperate resistance, the American com-

mander, Col. Ledyard, surrendered to the officer of the detachment, and was immediately killed with his own sword, most of his men being also butchered; 85 of the Americans were killed and 60 wounded, most of them mortally. A granite monument, to commemorate this event, was erected in Groton in 1830.

GROTTO (It. *grotta*), a natural cavern, or an artificial excavation in the earth. (See CAVE.) Among the most famous of those particularly designated by this name is the *Käsegrotte* at Bertrich, Rhenish Prussia, so called from the columnar piles of blocks of basalt shaped like cheeses, in the midst of which the cave extends. Still more celebrated is the *Grotta del Cano*, near Pozzuoli, Naples, referred to by Pliny as one of the class of excavations known as "Charon's ditches." In his time it would seem from his reference that the mephitic gas for which it is still remarkable was exhaled in quantity sufficient to prove fatal to human life. At the present time this forms but a shallow stratum upon the floor, in which a candle is extinguished and dogs are stifled by way of experiment. The custom of exhibiting the effect of the carbonic acid gas upon dogs has given the distinctive name to the grotto. The excavation is described as extending about 10 feet into the base of a hill, with a width of 4 and a height of 9 feet. Prof. Silliman, in his "Notes on Europe," speaks of it as a little hole dug artificially into the foot of a hill facing Lake Agnano. The aperture is closed by a door, and the space within is barely sufficient for one person to stand erect. Into this narrow cell a dog is dragged, and placed in a depression of the floor, where he is soon narcotized by the carbonic acid. The earth is warm to the hand, and the volume of gas given out is very constant.

GROUCHY, EMMANUEL, marquis de, a French general, born in Paris, Oct. 28, 1766, died in St. Etienne, May 29, 1847. He entered the military service when only 14 years old, and on the breaking out of the revolution had been for 5 years a lieutenant in the royal body guards. He was then placed in command of a regiment of chasseurs, took part in the campaign of 1792 under Lafayette, and was made a brigadier-general. The decree of the convention cashiering all officers who belonged to noble families, suspended for a while his career; reëntering the army as a private, he was reinstated in 1795 by a special decree and made a general of division. Being called to the army in Italy in 1798, he succeeded in persuading the king of Sardinia to abdicate and surrender Piedmont to France. In 1799, at the battle of Novi, he received 14 wounds and was taken prisoner. The battle of Marengo procured his liberation; he then joined Moreau on the Rhine, took part in the victory of Hohenlinden, and was made inspector-general of cavalry. He served in 1806 and 1807, in Prussia; was governor of Madrid in 1808; assisted in 1809 in the battle of Wagram, and finally signalized himself at the battle of Borodino in 1812. On the retreat from Moscow, he was

placed in command of the select guard which was to accompany the emperor. After the battle of Leipsic, he vigorously opposed the invasion of France by the allied troops, making a stand at Brienne, La Rothière, Vauchamps, and Étoges. A wound he received at Craonne, March 7, 1814, forced him to leave the army. Coldly treated by the Bourbons on the first restoration, he joined Napoleon at once on his return from Elba, and being placed in command of the army at Lyons, succeeded in capturing the duke of Angoulême; the reward of which service was his promotion to the rank of marshal of France. He played a conspicuous part in the concluding scenes of the Hundred Days; at the head of one of the corps of the army, he marched into Belgium against the united English and Prussians, fought successfully, June 18, at Fleurus and Ligny, received orders from Napoleon to follow up Blücher and the Prussian army to prevent their joining the English, and, strictly adhering to the very letter of these orders, declined, notwithstanding the entreaties of his subordinate generals, to march toward Waterloo, June 18, and thus became the indirect cause of the ultimate defeat of the French army. Being proscribed by a royal decree on the second restoration, he came to the United States and lived for 5 years in Philadelphia. An amnesty recalled him to France in 1821; and after the revolution of July, 1830, his rank of marshal was restored to him. His inactivity on the day of Waterloo caused him to be bitterly assailed, and he was even charged with treason. He vindicated his conduct in several pamphlets; the most important points of his defence are to be found in his *Fragments historiques*, which appeared in 1840.

GROUNDSEL, the common name of the botanical genus *senecio*, of the natural order *compositae*, and represented by a little, weedy plant found in waste places and in gardens from New England to Pennsylvania, adventitiously introduced from abroad. Its seeds are a favorite food of many small birds, and the flower heads are sometimes gathered for the purpose of feeding Canary birds. That curious motion of the contents of the cell called cyclosis can be seen in the young succulent hairs or *pappus* which invests the seeds. The fireweed (*erecthrites*, an ancient name for groundsel; *E. hieracifolia*, Raf.) is an American *senecio*, conspicuous in midsummer or early autumn on newly burnt lands, from its very white, silky heads of ripened seed, which is scattered far and wide, and proves rather too diffusive. The golden ragroot (*senecio aureus*) is an elegant ornament of our wet meadows; and in the greenhouse the rich purple blossoms of *S. elegans* are much admired. The groundsels are found in every part of the globe, especially in South Africa. Humboldt noticed *senecios* in the upper regions of the Andes, just below the limits of perpetual snow. De Candolle describes nearly 600 species, of which, according to Torrey and Gray, at least 40 are natives of North America. Gen-

erally they are of little value, although there are some kinds of the *senecionids* which have been employed in the treatment of disease.

GROUSE, gallinaceous birds of the family *tetraonidae*, characterized by a short broad bill, with culmen curved; the nostrils concealed by closely set feathers in the nasal groove; wings short, concave, and rounded; tarsi moderate and densely feathered; the toes usually naked, with scaly pectinations along the edges, but feathered to the claws in the snow grouse or ptarmigans. The tail varies in length and shape, and consists of 16, 18, or 20 feathers; there is generally a bare space about the orbits, with fringed processes above the upper lid; the hind toe is short, and slightly elevated. The old genus *tetrao* (Linn.) has been subdivided into many genera by modern systematists; it included both the grouse and the ptarmigans or moor fowl, the latter of which will be described under PTARMIGAN. The grouse are the largest of the family, robust and round-bodied, frequenting heathy woods, feeding on young shoots, tender buds, and berries, in pine and spruce forests, and cedar swamps in the northern regions of America, Europe, and Asia.—In the genus *tetrao* (Linn.) and the allied *centrocercus* (Swains.), the legs are feathered as far as the basal membrane of the toes; the tail is lengthened, slightly narrowed to the somewhat rounded tip, and the shafts stiffened; no ruff on the sides of the neck. The largest species is the wood grouse or capercaillie (*T. urogallus*, Linn.), measuring nearly 3 feet in length, and weighing about 15 lbs.; the feathers of the head and cheeks are elongated and erectile; the hind neck, back, and sides are minutely varied with black, brown, and gray; the lower breast and belly black, with a few white feathers; the fore part of breast rich glossy green, with metallic reflections. The females are much smaller, and, like the young males, have a brown color, with black crescent marks. In size, strong hooked bill, and noble bearing, it resembles a bird of prey; it is nearly extinct in Great Britain, though it is found in Norway, Sweden, Russia, and northern Asia. It inhabits forests of pine and birch with an undergrowth of juniper; it is extremely shy, but will breed in confinement, and may be domesticated, in which state it feeds on grains and resinous twigs. This species perches in trees; the nest is placed amid brakes and underbrush; the eggs are 8 to 16 in number, of a yellowish white color with darker yellow spots. The *T. hybridus* (Linn.) is generally considered a hybrid between the capercaillie and the black grouse (*T. tetrix*, Linn.); it is found in northern Europe, and is from 2½ to 2¾ feet long; the general color is black, with purple and bronzed reflections, dashes of white on the belly, and on the secondaries a spot of the same; the acapulars and wing coverts deep brown, with delicate yellowish waves; tail slightly forked, the upper coverts black, the under tipped with white. The black grouse has been described under BLACK-

cock. Among the American species are the dusky grouse (*T. obscurus*, Say), 20 inches long and 80 in extent of wings; the general color above is bluish black, and plumbeous or black below; tail of 20 feathers, black, finely mottled above, and broadly tipped with light slate; chin and throat white, varied with black; under tail coverts broadly tipped with white; in the female the colors are duller, with gray and brownish yellow on the back. It is found from Nebraska across the Rocky mountains to the Pacific coast between lat. 40° and 60° N. The Canada grouse, sometimes called erroneously the spruce partridge (*T. canadensis*, Linn.), is about 16½ inches long; the prevailing color is black in the male, each feather of the upper parts waved with leaden gray; those of the sides, scapulars, and outer surface of the wings have a central white streak expanding toward the tip; the under parts are mostly uniform black, broadly tipped with white on the sides, this color sometimes forming a pectoral band; bar across base of upper mandible, spot on lower lid, line on cheeks and throat, white; quills dark brown; tail of 16 feathers, dark brown, tipped with a band of orange chestnut ¼ inch wide; chin, throat, and bill black; under tail coverts black, barred and tipped with white. The female is smaller, but similar, with broader black bars above, and below barred with orange and white; the continuous black on the head and breast is wanting. They are found in the spruce forests and cedar swamps of the northern states to the arctic seas, and westward nearly to the Rocky mountains; their flesh, like that of the other grouse, is excellent, but in the winter it has the bitter flavor of the spruce on which they feed at that season of the year. They are not very shy; when alarmed they resort to trees; the nest is made upon the ground, and the eggs, comparatively few in number, are varied with white, yellow, and black. Franklin's grouse (*T. franklinii*, Douglas), which replaces the last to the west of the Rocky mountains, and by some considered a mere variety of it, has the tail feathers entirely black, and the upper tail coverts broadly tipped with white.—The pheasant-tailed grouse, sage cock, or cock of the plains (*centrocercus urophasianus*, Bonap.), is by far the largest of the American grouse, measuring about 30 inches, with an extent of wings of about 40; the tail is very long, wedge-shaped, the feathers all lanceolate, and larger than the wings; the feathers of the lower throat and sides are stiff and spiny. Above, the plumage is varied with black, brown, and brownish yellow, the coverts streaked with the latter; black below, the breast and tips of tail coverts white, the lower part of the former with black streaks; the tail has 20 feathers. It is found in the desert plains of the far west, especially about the branches of the Columbia river; it feeds upon the various species of wormwood, which impart a bitter flavor to its flesh; it is not shy, and a poor flier; the eggs are numerous, 15 to 17, of a wood brown color, with ir-

regular chocolate blotches on the larger end, and of about the size of those of a common fowl. The sharp-tailed grouse (*C. phasianellus*, Linn.; genus *pedicocates*, Baird) has a short, graduated tail of 18 feathers, the central pair elongated about an inch beyond the rest; the length is 18 inches, and the extent of wings 26. Above, the color is light brownish yellow, varied with black, and with rounded white spots on the wings; below pure white, with dark V-shaped marks on the breast and sides; there are no elongated feathers on the neck, as in the next species, and the bill is stouter, and the tarsi more densely feathered. It inhabits the northern prairies and plains from Illinois and Wisconsin to Oregon and Washington territories. Its food consists of the buds and sprouts of the beech, willow, aspen, larch, and similar trees, and of berries in the autumn; the eggs, about 18, are white, with colored spots. The pin-nated grouse, prairie hen or chicken (*T. cupido*, Linn.; genus *cupidonia*, Reich.), has a tail of 18 feathers, short, truncate, and much graduated, and a tuft of long, lanceolate feathers on each side of the neck, covering a bare space capable of considerable inflation. The plumage is covered with transverse bands of white on a brown ground, the latter nearly black, and the former with a rufous tinge, above; long feathers of the throat black; different specimens vary much in color. The length is about 17 inches, with an extent of wings of 28, and a weight of 8 lbs. This species, once common in the Atlantic states, is now mostly confined to the western prairies and plains; the old name in New York was heath hen. The food is acorns, buds, leaves, berries, and grains. They do not migrate, but remain all the year in their favorite and barren grounds; in the spring the males are in the habit of meeting at break of day in what are called "scratching places," where they swell and strut with great pomp, and engage in fierce contests, uttering a peculiar sound rendered more intense by the large inflated sacs on the sides of the neck. Their flesh, as well as that of the preceding species, is excellent food.—The ruffed grouse, erroneously called partridge in New England and pheasant in the middle states (*bonasa umbellus*, Linn.), is familiarly known by its ruff of velvety black feathers on the sides of the neck, its broad fan-like tail of 18 feathers, partially crested head, and tarsi naked in their lower half. The sexes are nearly alike. The bird is so well known that it will be sufficient to state that it is reddish brown or chestnut above, varied with lighter heart-shaped spots and streaks of light brownish yellow; below, whitish, with transverse bars of dull brown; tail tipped with gray, with a subterminal bar of black. The length is 18 inches, and the extent of wings 2 feet; it is found in the eastern states and Canada, and probably as far as the Rocky mountains. The species of the Pacific coast, of a darker color and with a longer middle toe, has been described as the *B. sabinii* (Douglas). The ruffed grouse prefers wooded regions, where



evergreen trees and streams abound, and among the hills of the north. They are rather solitary, usually seen in pairs or single, and fond of frequenting travelled paths; the males make a peculiar drumming sound, standing upon a log, inflating the body, and beating the air with short and quick strokes of the wings, gradually becoming so rapid as to constitute a continuous drumming; this is most commonly heard in the morning and evening, but also at all times of the day; the sportsman is often led to his game by this sound, though it is not easy to calculate the actual distance of the bird. The nest is built on the ground, early in May, and the eggs, 9 to 15, are clear brownish white; the female, like other birds of the family, exhibits signs of great distress when her young brood are approached, and makes use of various well known stratagems to lead the intruder from the spot. The flight is vigorous, and accompanied by a loud whirring noise; they are easily hunted with a good dog, generally betaking themselves to a tree; they are taken in traps and snares set in their favorite paths; in severe winters they are often found frozen under the snow, into which they dive for protection, a crust having unexpectedly formed above them. Their flesh is excellent, and in best condition in the autumn, when the partridge berries impart a peculiar aromatic flavor; in the winter they are sometimes forced to eat the tender buds of the laurel, and then their flesh may possess poisonous properties so strong as to cause death in delicate persons. There is a species of this genus in Europe, *B. sylvestris* (Brehm.).—The willow or white, the rock, the white-tailed, the American, and the red grouse of Europe, belong to the genus *lagopus* (Briss.), and will be described under PTARMIGAN.—The sand grouse (*ptarmicus*, Temm.) represents the family of *trogonidae* in the sandy deserts of Asia and Africa, and in some of the bare rocky plains of southern Russia; their very long and pointed wings, with the 1st and 2d quills the longest, enable them to traverse vast distances with an ease and rapidity unnecessary in birds of the moor and forest; their bodies are light and slender, and the tail large and wedge-shaped; the tarsi robust, long, covered with feathers in front and on the inside; the short and stout toes, united at the base by a prominent membrane, enable them to run lightly over the soft sand. Their prevailing colors are shades of brown, gray, and ochreous yellow, like that of the deserts in which they live. The banded sand grouse (*P. arenarius*, Pall.), found occasionally in Europe, has the belly deep brownish black, with a spot of the same on the throat and a band on the breast; the female is paler, without the patch on the throat. The food consists of seeds, bulbs, and insects; the nest is made upon the ground, and the eggs are only 4 or 5 in number. The pin-tailed sand grouse (*P. alchata*, Linn.) is remarkable for the elongation of the central tail feathers and for its strong bill; it is found in southern Europe and northern Africa. In the allied genus *syrrhaptes* (Illig.) the bill is

small and slender; the wings very long, with the 2d quill and the 2 middle feathers of the long wedge-shaped tail ending in lengthened threads; the tarsi are entirely covered with feathers; the only species described by Gray inhabits northern Asia.—The grouse are polygamous, and very tyrannical in their gallinaceous haroms; after the short love season the males desert the females and lead a solitary life, caring neither for mate nor progeny; in the words of Bonaparte: "Like perfidious seducers, they are full of attentions however, and display the greatest anxiety to secure the possession of those they are afterward so ready to abandon." The name of partridge cannot properly be given to any grouse; the genus *perdix* (Briss.), and indeed the whole family of *perdicinae*, are not found in America; the term is equally inapplicable to the quail family. The name of pheasant, given to the ruffed grouse in the middle states, is also erroneously applied, as all the *phasianinae* belong to the old world.

GROVE, WILLIAM ROBERT, an English lawyer and physician, born in Swansea, July 14, 1811. He was graduated at Oxford in 1833, and for the next 5 years was professor of natural philosophy at the London institution. While pursuing with distinction the duties of an advocate, he devoted his leisure to scientific investigations, advancing the progress of the sciences he cultivated and acquiring fame by his original discoveries. In 1852 he was made queen's counsel, and afterward vice-president of the royal society. His scientific researches have been chiefly in the field of electricity; and his contributions to the "Philosophical Magazine," "Philosophical Transactions," "Literary Gazette," and "Electrical Magazine," principally on this subject, have been very numerous. A few only of his original researches can here be noticed. In 1839 he described in the "Philosophical Magazine" his new form of battery, ever since in general use and known by his name, in which platinum is substituted for the copper plate, and nitric for sulphuric acid. This battery, according to Prof. Jacobi, is 6½ times more powerful than any before in use. About the same time he made the interesting discovery that if two pieces of gold are placed, one in a cell of nitric, and the other in one of hydrochloric acid, and the cells separated by an earthenware partition, no chemical action takes place; but if the two pieces be connected by a metallic wire, then they are immediately attacked by the acids. In 1841 he described in the same journal a method of engraving the daguerreotype plate by galvanic action, by making it the positive pole of a battery supplied with hydrochloric acid; the silver is attacked by the nascent chlorine where it is unprotected by mercury, and impressions may be taken from it upon paper, or it may serve to furnish electrotype copies. In 1847 he published an octavo volume, of which a second edition appeared in 1855, "On the Correlation of Physical Forces," in which he explains the intimate union existing

between light, heat, electricity, magnetism, and chemical action, and how neither one can be produced except at the expense of some of the others. Mr. Grove was the first to show that electrical action is produced by proximity without contact of dissimilar metals; that molecular movements are induced in metals by the electric current; that hydrogen chills like water a platinum wire brought to white heat by the galvanic battery. With a battery of 500 pairs he showed at the royal institution that platinum wire may be melted on the surface of water, and be kept suspended in a globe above it by the force of the electric current. In his experiments made in 1856 upon the application of electricity as a mechanical power, he demonstrated that when by electric attraction or repulsion a weight is suspended, it is at the expense of electric tension, and the spark can no longer traverse the same distance as before. In 1857, while prosecuting the researches pointed out by Karsten, he discovered that if letters cut in paper or in tinsel, or printed on one side of paper, be placed between two sheets of glass, the external surfaces of which are covered with tin foil, like a Leyden jar, and this be submitted to the action of a Rhumkorff machine, an imprint of the letters is produced upon the glass, which, invisible at first, is brought out on exposing the glass to the action of fumes of hydrofluoric acid or by other methods.

GRUBENHAGEN, a principality of Hanover, in the province of Hildesheim, divided into two unequal parts by the Hartz mountains; area, about 876 sq. m.; pop. 76,200. The soil is not fertile, and the quantity of corn grown is very limited; but the mines are various and valuable, and furnish employment to most of the inhabitants. There are manufactories of woollen, linen, and lace. Capital, Einbeck.

GRUBER, JOHANN GOTTFRIED, a German author and cyclopædist, professor of philosophy in the university of Halle, born in Naumburg, Prussia, Nov. 29, 1774, died in Halle, Aug. 7, 1851. He wrote nearly 80 works on different subjects, historical, critical, and imaginative, and was joint editor, with Ersch, of the "Universal Cyclopædia of Sciences and Arts." His "Life of Wieland" (2 vols., Leipzig, 1815-'16) is much esteemed.

GRÜN, ANASTASius. See AUERPERG.

GRÜNBERG, a town of Prussian Silesia, capital of a circle of the same name in the government of Liegnitz; pop. 10,600. It is walled and surrounded by suburbs. It manufactures woollen cloths, linens, printed cottons, silk goods, leather, and champagne wine.

GRUNDTVIG, NICOLOI FREDERIK SEVERIN, a Danish theologian, historian, poet, and politician, born at Udby, Seeland, Sept. 8, 1788. He studied theology at Copenhagen, but his first sermon, in 1810, gave so great offence to the clergy of that city, that they caused his name to be erased from the list of candidates eligible for the ministry. From 1811 to 1818 he served as vicar in his father's parish, during

which time he delivered another remarkable sermon on the question: "Why are we called Lutherans?" From 1818 to 1815 he often preached in Copenhagen, and rose steadily in the favor of the people and the disfavor of the clergy. Notwithstanding the opposition of the latter, he was appointed by the king, in 1822, preacher at one of the churches of Copenhagen, where he exerted himself in favor of the restoration of Lutheran orthodoxy, and established with Dr. Rudelbach the "Theological Monthly" (*Theologisk Maanedsskrift*). A violent article against the rationalistic professor Clausen involved him in a lawsuit which caused him to resign his place in 1826. For several years he and his friend Lindberg held secret conventions with their followers, until in 1832 he obtained for them permission to meet publicly. In 1839 he was again appointed preacher at the Marton hospital in Copenhagen. In the mean time his theological views had undergone a great change. He separated from the orthodox Lutheran school, and became the leader of a party which is opposed to centralization of church government, claims full freedom of self-government for every Christian congregation, rejects the authority of the symbolical books of the Lutheran church, distinguishes the oral word of God, propagating itself in the Christian church, from the letter of the Bible, and attaches to the former a greater importance for the church than it has according to the confessions of faith of the other Protestant churches. Having been, in 1848, a member of the constitutive diet, and later of the *Folkething*, he prevented the creation of a supreme ecclesiastical council for the state church, and carried through the abolition of the law concerning the compulsory baptism of infants within a specified number of days. In 1857 the party following him as leader counted about 150 members among the clergy of the state church, and two organs. In 1859 their leading paper, the "Danish Church Gazette," intimated that they were likely to secede in a body from the state church. Beside the "Theological Monthly" already mentioned, Grundtvig published two collections of sermons, *Bibelske Prædikener* (1816), and *Christelig Søndagsbog* (3 vols., 1826-'30), and a collection of hymns, *Sangeværk til den Danske Kirke* (1837). Among his numerous historical works are: *Nordens Mythologie* (1808; 2d ed. revised, 1832); *Kort Begreb af Verdenskrønike* ("Short Sketch of the History of the World," 1812); translations of Saxo Grammaticus and Snorro Sturleson (6 vols., 1818-'22); and a manual of universal history, begun in 1833, of which 4 volumes have been published. Among his poetical works are: *Optrin af Kampeløbet Undergang i Nord* (2 vols., 1809); *Roeskilde Riim* (1814); *Qvædtinger* (1816); *Nordiske Smaadigte* (1838). From 1816 to 1820 he published a literary journal, *Dannevirke*, and since 1848 he has been an influential and popular politician, and leader of the Danish party, which endeavors to check the progress of the German language in Schleswig,

and a warm advocate of the Pan-Scandinavian tendencies. He published from 1848 to 1851 a political weekly, *Danskereen*.

GRUNDY, the name of 4 counties in the United States. I. A. S. co. of Tenn., drained by Collins river; area, 800 sq. m.; pop. in 1850, 2,778, of whom 286 were slaves. It has a mountainous surface and a fertile soil. The productions in 1850 were 158,000 bushels of Indian corn, 20,767 of oats, and 13,309 lbs. of butter. There were 6 churches, and 400 pupils attending public schools. Capital, Altamont. II. A. N. E. co. of Ill., drained by Illinois river and its head waters; area, 430 sq. m.; pop. in 1850, 7,021. The surface is generally level, and the soil is fertile. Timber is not abundant, but bituminous coal has been found. The productions in 1850 were 46,875 bushels of wheat, 32,851 of oats, 143,778 of Indian corn, and 7,329 tons of hay. There were 8 grist mills, 1 saw mill, 1 church, and 850 pupils attending public schools. The county is intersected by the Illinois and Michigan canal, and the Chicago and Rock Island railroad. Capital, Morris. III. A. N. co. of Mo., drained by Weldon and other rivers, and consisting chiefly of fertile prairies; area, 462 sq. m.; pop. in 1856, 4,989, of whom 188 were slaves. The productions in 1850 were 10,902 bushels of wheat, 28,136 of oats, 152,770 of Indian corn, 201 tons of hay, and 19,850 lbs. of butter. There were 3 grist mills, 1 saw mill, and 325 pupils attending public schools. Capital, Trenton. IV. A central co. of Iowa, drained by affluents of Cedar river; area, about 500 sq. m.; pop. in 1856, 435. The productions in 1856 were 650 bushels of wheat, 950 of oats, 6,255 of Indian corn, 322 tons of hay, and 3,190 lbs. of butter.

GRUNDY, FELIX, an American statesman, born in Berkeley co., Va., Sept. 11, 1777, died in Nashville, Tenn., Dec. 19, 1840. His father was an Englishman who emigrated to Virginia when young, in 1779 settled near Brownsville, Penn., and in 1780 removed to Kentucky. The youth of the son was thus passed in the wilderness on what was then the frontier of the states, exposed to all the dangers of Indian warfare, at a time when, in his own language, "death was in almost every bush, and when every thicket concealed an ambuscade." Kentucky was then known as "the dark and bloody ground." Felix, being the 7th son of his father, was, in accordance with the superstitious notions of his mother, educated for a physician; but after finishing his studies at Bardstown, he abandoned medicine, and studying law, was admitted to practice in 1798. He soon acquired a high reputation as an advocate in criminal cases. In 1799 he was chosen a member of the convention to revise the constitution of the state. In the same year he was also elected to the legislature, and served in that body till 1806, when he was appointed one of the judges of the supreme court of errors and appeals. Soon afterward, on the resignation of Judge Todd, he was appointed chief justice of Kentucky. The salary,

however, not being sufficient for the expenses of his family, he resigned the office in 1808, and removed to Nashville, Tenn., where he pursued his profession with such success that he soon ranked as the head of the Tennessee bar. In 1811 he was elected a representative to congress, and efficiently supported the administration of President Madison in the measures which led to and carried on the war with Great Britain. He was reelected in 1813, but declined to be a candidate in 1815, and for the 4 succeeding years he devoted himself exclusively to his profession. In 1819, and for 5 or 6 years immediately following, he was a member of the state legislature. In 1829, and again in 1833, he was elected to the senate of the United States. During his service in the senate he was among the most prominent of the supporters of President Jackson. In 1838 President Van Buren appointed him attorney-general of the United States; but in 1840 he resigned that office, and was reelected to the senate. He died, however, before he had taken his seat.

GRUNER, CHRISTIAN GOTTFRIED, a German physician, born in Sagan, Nov. 8, 1744, died in Jena, Dec. 4, 1815. He officiated for some time as professor of botany at the university of that city, and, beside various treatises, he wrote about 50 works which treat of almost all departments of medical science.

GRUNER, WILHELM HEINRICH LUDWIG, a German engraver, born in Dresden, Feb. 24, 1801. He cultivated his talent by studies in Italy, Spain, France, and England. His first effort, an engraving of a Spanish shepherd, after Velasquez, was followed by a portrait of Mengs, by engravings of Madonnas after Raphael, and of the paintings of Giulio de' Medici and Moses by Murillo. In Rome he published in 1839 a series of engravings, under the title, *I mosaici della cappella Ghigi*, and soon afterward he copied the frescoes in the hall of Heliodor. For the Berlin museum he prepared, at the request of the king of Prussia, a series of engravings after the cartoons of Raphael at Hampton Court. A disease of the eyes preventing him from working with the burin, he executed many frescoes by order of Prince Albert, and published in London in 1844, "Fresco Decorations and Stuccoes," &c., and, at the special command of the queen of England, "Decorations of the Garden Pavilion in the Grounds of Buckingham Palace" (London, 1846), accompanied with a text by Mrs. Jameson. Subsequently he was enabled to resume his labors as an engraver. In 1848 he published "Ornamental Designs for Decorators and Manufacturers," and in 1850, at the request of the British school of design, "Specimens of Ornamental Art." He took a part in the decoration of the London crystal palace and in the illustration of the London crystal palace and in the illustration of Layard's "Nineveh." His "Raphael Caryatides from the Vatican" appeared in 1862.

GRUNERT, JOHANN AUGUST, a German mathematician, born in Halle, Feb. 7, 1797, in 1833 appointed professor of mathematics at the uni-

versity of Greifswalde, and since 1838 teacher of technology and mathematics at the agricultural academy of Eldena. He has written numerous manuals of mathematics and geometry, which have passed through many editions. Among his most important works are: *Sphäroidische Trigonometrie* (Berlin, 1838); *Elemente der ebenen, sphärischen und sphäroidischen Trigonometrie* (Leipzig, 1837); *Loxodromische Trigonometrie* (1849); *Optische Untersuchungen* (1847-'51); *Beiträge zur meteorologischen Optik, &c.* (1850), &c. He continued and completed Klügel's mathematical dictionary, and has contributed largely to scientific periodicals, especially to the Greifswalde *Archiv für Mathematik und Physik*, of which he is the editor.

GRUTER, JAN, a Dutch scholar and philologist, born in Antwerp, Dec. 3, 1560, died near Heidelberg, Sept. 20, 1627. He was educated at Cambridge and Leyden, and was appointed professor of history at the university of Wittenberg; but being required to sign the "Act of Concord," he resigned this office, and accepted a professor's chair at Heidelberg. Gruter was a very voluminous writer. His most important works are his *Inscriptiones Antiquæ totius Orbis Romani* (Heidelberg, 1601); *Lampas sive Fax Artium Liberalium* (6 vols. 8vo., Frankfurt, 1602-'12); *Historia Augusta Scriptores* (fol. 1609); and annotated editions of Pliny's epistles, and of the works of Seneca, Cicero, Livy, Plautus, Ovid, &c.

GRUYÈRE, or GRUYÈRES (Ger. *Greyers*), a village of Switzerland, canton and 15 m. S. S. W. of Freyburg; pop. 950. It stands on a hill, the summit of which is crowned with one of the most ancient and perfect feudal castles in Switzerland. This village contains a church and hospital, and gives name to a celebrated kind of cheese, of which about 40,000 cwt. is annually made in the vicinity.

GUACHARO, a fesiistrostral bird of the family *caprimulgidae* or goatsuckers, sub-family *steatornina* or oil birds, and genus *steatornis* (Humboldt). This is the only described species of the genus, and is the *S. Caripensis* (Humb.); it is a nocturnal bird, living in great numbers in the cave of Guacharo near Caripe in Venezuela, described by Humboldt, and referred to in the article CAVE; the family and genus are noticed in the article GOATSUCKER. The bird is about the size of the common fowl, with a curved and toothed bill; the color is dark bluish gray, with minute streaks and spots of deep brown, and white spots bordered with black on the head, wings, and tail; the spread of the wings is about 8½ feet. The food is vegetable, principally seeds and hard fruits, upon which they grow so fat that the Indians destroy great numbers for the sake of their oil, which they use in preparing their favorite dishes. They would long ago have been exterminated, were it not for the superstitious fears of the natives, who do not dare to penetrate far into their caves, terrified by the shrill cries of the vast multitudes when disturbed by the torches of

inquisitive explorers. The hard and dried fruits found in their crops and gizzards are considered excellent remedies against the intermittent diseases of the country.

GUACHOS, wild herdsmen on the pampas of South America, descendants of the early Spanish colonists, thinly scattered over immense districts, and hunting and tending the countless horses and horned cattle which roam over the plains. Many of them, descended from some of the best families in Spain, possess good manners and noble sentiments. The guacho costume is chiefly distinguished by a sort of short petticoat, and their essential accoutrements are the long dirk knife, the coiling lasso, the *bolas*, or balls of iron, fastened to each end of a thong of hide, which they can hurl a distance of 60 feet and entangle around the legs of a galloping herd, the gourd which dangles at the waist containing an infusion of Paraguay tea which is sucked through a tin tube, the string of dried beef, the pouch full of tobacco, the paper for manufacturing it into *cigarritos*, and the cow's horn filled with tinder, with flint and steel attached. Thus mounted and equipped, the guachos are ready for a gallop of a thousand miles. The life they lead is wild but interesting. Many of them inhabit the huts in which they were born, and in which their fathers and grandfathers lived before them. All of these are in the same form, built of mud and maize stocks, and covered with long yellow grass. The *corral*, which is nearly 100 yards distant from the hut, is a circle of about 80 yards in diameter, enclosed by a number of strong rough posts. These posts are generally occupied by vultures and hawks, and the ground around the hut and corral is covered with bones and carcasses of horses, bullocks' horns, wool, and hair, which give it the smell and appearance of an ill-kept English dog kennel. The hut consists usually of but one room, in which all the family are huddled together, the kitchen being a detached shed a few yards off. In the summer this abode is filled with fleas and *binchucas* (bugs as large as black beetles), so that the family sleep on the ground in front of their dwelling. Travellers are hospitably welcomed. When the supper is ready, the great iron spit on which the beef has been roasted is brought into the hut, and the point is fixed in the ground. The guacho then offers his guest the skeleton of a horse's head for a seat, and the family on similar seats range themselves around the spit, from which with long knives they cut large mouthfuls. Born in the rude hut, the infant guacho receives little attention, but is left to swing from the roof in a bullock's hide, the corners of which are drawn toward each other by strips of hide. At 4 years of age he is on horseback, and immediately becomes useful by assisting to drive the cattle into the corral. He soon fearlessly mounts any colt on the pampas, gallops after the ostrich and guan, fights single-handed with the jaguar, and daily aids in catching the wild cattle and dragging them to the corral either for slaughter

or to be marked. As his constant food is beef and water, his constitution is so strong as to endure great fatigue, and the distances that he will ride without cessation are marvellous. It is chiefly while a young man that he resorts on Sundays and festive days to the *pulperias*, the bar-rooms of the pampas, where he drinks Paraguay rum and listens to the *cantor*, or guacho minstrel, as he sings, sometimes to the accompaniment of his guitar, the exploits of some desert hero. The frequenters of the *pulperia* delight in scenes of violence; and a murder committed sometimes makes a guacho a permanent outlaw, a *guacho malo*, at home only in the desert, intangible, sanguinary, and remorseless. As a guide, the guacho is famous for knowing the peculiarities of 20,000 square miles of mountain or plain. As a *rastreador*, or trailer, he can detect with unerring accuracy the footprints of his own herd; and when an animal is missing, he gallops to the place where he last saw it, follows its trail whatever distance to the strange herd to which it has escaped, and launching his lasso through the air drags the estray away with him. The guacho is a person almost without wants; he has no luxuries, and he cares for none; but his character is often estimable. It is curious to see them with their rude habits always raise their hats when meeting each other in a hut. The women have literally nothing to do; they seldom walk or ride; but all have families, whether married or not. The guachos, from their situation, are mainly independent of the political troubles of the inhabitants of the towns. They are Roman Catholics, but with some irregularities, being beyond the reach of the priests, who reside in the towns. In almost all the huts there is a small image or picture, and a cross is sometimes worn from the neck. The children are carried to the nearest church to be baptized; the bridegroom takes his bride on a horse behind him, and can usually obtain the sanction of the church in a few days; and the dead are generally carried on horseback and buried in consecrated ground. The guachos are often invaded and plundered by the Pampas Indians, between whom and them exists an inveterate and furious hatred.

GUACO, or HUACO, a name given in the tropical regions of America to several plants allied to the *eupatorium*, used as antidotes for the bites of poisonous snakes. The most prominent of these is the *Mikania guaco*, of the natural order *composita*, described by Humboldt and Bonpland as a plant with twining stems, its branches round, sulcate, and hairy; leaves ovate, pointed, and dentate, rough above and hairy beneath, and flowers in opposite, axillary corymbs. The fresh leaves are bruised and applied to the wound, and they are also made to yield an infusion which is drunk at the same time. The preparation has a bitter, disagreeable taste, and acts as a mild tonic and a gentle stimulant to the secretions. It is employed also as a febrifuge, and has been recommended in

cases of chronic rheumatism, &c. (See "American Journal of Science," vol. xxiv. p. 279.)

GUADALAJARA, or GUADALAXARA, the 2d city of Mexico, and capital of the state of Jalisco, on a broad plain near the Rio Grande de Santiago, 161 leagues from Mexico; pop. about 60,000. It is well built, and tastefully laid out with handsome and airy streets, although the houses are seldom more than one story high, a necessary precaution owing to the prevalence of earthquakes in that region. It has 14 public squares, including a beautiful *alameda* or park, decorated with trees and a fountain. The principal public buildings are a magnificent cathedral, several churches and convents, some of them large and elegant, the house of congress, the mint, bishop's palace, opera house, college, and extensive barracks. The markets and shops are well filled. There are considerable manufactures of serapes and other articles of cotton, earthenware, and leather, which are exported to other parts of the republic.

GUADALAJARA, or GUADALAXARA, a province of Spain, in New Castile, bounded N. by Segovia, Soria, and Saragossa, E. by Saragossa and Teruel, S. by Ouenza, and W. by Madrid; area 1,946 sq. m.; pop. in 1857, 242,171. The surface toward the N. and E. is in general mountainous, particularly in the district of Atienza, where some of the highest summits in Spain are to be found; but toward the S. and W. it frequently expands into large though elevated plains. The chief rivers are the Tagus, Tajuña, and Jarama. In the district of Tamañon the soil is well adapted to corn, yet not to the vine and olive; in that of Alcarria every thing common to that latitude comes to perfection, while the mountain districts are suited to pasturage and the rearing of cattle. The most important minerals are iron, lead, and coal. Mines of the former metal have been worked from the time of the Romans. The capital, Guadalajara, pop. 10,000, has a large Roman aqueduct which supplies the public fountains with water.

GUADALQUIVIR (anc. *Batis*), a river of Spain, which rises near the S. frontier of the province of Jaen, flows first N. W. and then S. W. through Andalusia, passing Andujar, Villafraña, Cordova, and Seville, and falls into the Atlantic at San Lucar de Barrameda, 14 m. N. of Cadiz. It is over 250 m. long, and is navigable for nearly 70 m. from its mouth. Its principal tributaries are the Guadalimar, Guadiana, Escobar, Guadiana Menor, and Jandula. The region of country which the Guadalquivir drains contains an area of about 26,000 sq. m.

GUADALUPE, a S. W. co. of Texas, drained by the Guadalupe river, from which it is named; area, 860 sq. m.; pop. in 1858, 5,187, of whom 1,806 were slaves. It has an undulating surface, covered with prairies and good timber. The productions in 1850 were 80,830 bushels of Indian corn, 8,050 of sweet potatoes, 183 bales of cotton, 1,540 lbs. of tobacco, 84,265 of butter, and 4,281 of wool. There were 2 saw mills, 1

grist mill, and 1 church. Value of real estate in 1858, \$1,049,253. The San Antonio and Mexican Gulf railroad is to pass through this county. Organized in 1846. Capital, Seguin. • GUADELOUPE, one of the Leeward islands of the West Indies, and the most important of those which belong to France, between lat. 15° 47' and 16° 30' N., and long. 61° 15' and 61° 45' W.; area, 529 sq. m.; pop. in 1856, 181,160, about  $\frac{1}{2}$  of whom are colored. It consists, properly speaking, of two islands, which are separated by a narrow channel, not more than from 80 to 100 yards broad, called Rivière Salée, or Salt river, which is navigable for vessels of small burden. The western, or larger island, styled Guadeloupe Proper, is about 27 m. long and 15 m. wide; the eastern, or smaller one, called Grande-Terre, is nearly 80 m. long, and from 10 to 12 m. wide. Guadeloupe Proper is of volcanic origin, and is traversed from N. to S. by a mountain range whose highest summit is a volcano over 5,000 feet above the sea. Grande-Terre, on the contrary, is low, flat, and marshy, being composed of coralline matter and marine detritus. The climate is in general hot, humid, and unhealthy. Hurricanes are frequent and destructive, but violent earthquakes rarely happen, that of 1843 having been the first severe one since the discovery of the island. The soil is for the most part fertile and well cultivated. The principal exports are sugar (47,000,000 lbs. in 1854), molasses, rum, cotton, tobacco, coffee, dye woods, and copper. The principal imports are cotton goods, pottery, glassware, provisions, and medicines. The exports in 1856 were valued at \$3,300,000, and the imports at \$2,900,000. The value of imports from the United States is about \$450,000 a year. The government of Guadeloupe consists of a governor, a privy council of 6, and a colonial council of 30 members. It has its seat at Basse-Terre, the capital, and exercises jurisdiction over the islands of Guadeloupe, Marie Galante, Desirade, Les Saintes, and St. Martin. Grande-Terre possesses 2 harbors, those of Moule and Pointe-à-Pitre. The latter, at the S. entrance of the Rivière Salée, is one of the best in the Antilles, and is the residence of a U. S. consul. Guadeloupe was discovered by Columbus, Nov. 4, 1493. It was taken possession of by the French in 1635, and after having been repeatedly taken from and by them in the next century and a half, it was ultimately restored to them in 1816. The principal event since that time was the emancipation of the slaves in 1848. A bishopric was created there in 1850, and an imperial decree dated July 26, 1854, regulated the administration of colonial affairs.

GUADET, JOSEPH, a French author and philanthropist, born in Bordeaux in 1795. Educated as a lawyer, he early devoted himself to literary labors, and soon received an appointment as teacher in the imperial institute for blind youth at Paris, where he is now the director-in-chief. He has prepared many works for the use of the blind, a very complete history of the instruction of the blind in France, and biog-

raphies of blind artists and mechanics; he is also the author of some 18 or 20 volumes on historical, chronological, and political topics, which have had a large circulation. His *Saint Émilien, son histoire et ses monuments* (8vo., 1841), obtained for him in 1838 the gold medal of the institute.

GUADIANA (anc. *Anas*), a river of Spain, rising on the N. side of the Sierra Alcaraz, in La Mancha, and falling into the Atlantic between the Spanish town of Ayamonte and the Portuguese town of Castro Marim. It flows first N. W., and after several windings enters Estremadura, which it traverses in a westerly direction, passes Badajoz, turns toward the S. S. W., and forms 80 m. of the boundary between Spain and Portugal. It then enters the Portuguese province of Alemtejo, flows S. E. and S., and after passing the town of Serpa forms a cataract called the *Salto del Lobo* (leap of the wolf) in a narrow passage between the Sierra Morena and the Sierra de Caldeirão. After receiving the Chanza it again forms the Spanish boundary for 80 m. to the sea. It is navigable for some distance above the mouth of the Chanza. Length about 880 m.

GUADIX, an ancient city of Spain, in the province of Granada, on the N. declivity of the Sierra Nevada; pop. 10,000. It was once a place of considerable strength, and is still surrounded with walls, and is said to be the oldest bishopric in Spain.

GUAHAN, GUAM, or SAN JUAN, the largest and southernmost of the Marianne or Ladrones islands in the N. Pacific, in lat. 13° N., long. 145° E.; pop. about 5,000. It is about 100 m. in circumference, and surrounded by coral reefs. The coasts are broken by several bays, one of which, called Calderone de Apra, is known to sailors as a commodious haven. The S. part of the island is of volcanic formation, and there is also a small volcano in the N., but the shores on this side are composed of bold coralline masses. The interior is well watered, wooded, and fertile, rice, maize, cacao, sugar cane, indigo, cotton, and a great variety of fruits, growing in profusion. The domestic animals of Europe, which have been imported here by settlers, are found in a savage state. The inhabitants are not aborigines, the primitive possessors of the island having been long ago extirpated, but are mostly descendants of Mexicans and Philippine islanders, who were brought here by the Spaniards, to whom the island belongs. They are peaceable and friendly, and are skillful mechanics. The principal place is San Ignazio de Agaña, a fortified village of bamboo huts, containing not more than 1,500 inhabitants, but having a good harbor enclosed by coral reefs. It was formerly a victualling station for Manila galleons. The island was discovered by Magellan in 1521.

GUALACUM, a resinous substance from the *guaiacum officinale*, of the natural order *symplocophyllaceae*. The tree grows in the West Indies and upon the mainland opposite. The

trunk is sometimes 5 feet in circumference. The wood, known as *lignum vitae*, is remarkably heavy and hard, and is much used for the sheaves of blocks, for nine-pin balls, and other purposes requiring strength and resistance to wear. It possesses medicinal properties, as does also the concrete juice or resin, and in a much higher degree the bark; but the shavings of the wood and the resinous juice, or "gum gualacum," only are kept by the druggists for the sake of these properties. The wood contains about 26 per cent. of resin, and 0.8 of a bitter pungent extractive. It is administered in decoction, and usually in combination with other medicines. Its action is stimulant and diaphoretic. The resin, which is the more active medicine, is obtained either by spontaneous exudations from incisions made into the tree (which is the "gualac in tears"), or by heating blocks of the wood, in which auger holes have been bored in the centre in the direction of the grain, and collecting the juice as it flows out through the holes; also by boiling the chips and sawdust of the wood in salt water, and skimming off the water which rises to the surface. This is the form in which it is usually met with. The irregular-shaped pieces brought to the United States are of a dark olive color without and reddish brown within, diversified with various shades; they possess a slight fragrant odor, and a pungent acrid taste after being held in the mouth a short time. The pure substance is entirely soluble in alcohol, ether, alkaline solutions, and sulphuric acid. It is adulterated with common resin, from which it may be distinguished by the solubility of the latter in turpentine. The powder becomes green by exposure to the light; it is often administered in this form, made into pills. In Europe it is prepared with liquor potassæ, which is diluted with twice its weight of water and boiled, when the gualacum is gradually added and stirred in to the point of saturation. The compound is then filtered, evaporated, and made into pills. Gualacum is administered in many complaints, and is especially beneficial in acute and chronic rheumatism. It promotes various secretions, and excites profuse perspiration. In large doses it purges. It is also an alterative, and is beneficially applied in scrofulous diseases, cutaneous eruptions, &c.

GUALAN, a town of Guatemala, situated on the *camino real* from the port of Isabal to the city of Guatemala, at the point where it crosses the Rio Motagua, also sometimes called Rio Gualan; pop. 4,000. It is well built, adorned with a fountain, and has a large church and town hall. It is the principal town in the eastern part of the republic, and the largest on the route to the capital from the Atlantic. Isabal may be considered the port of Gualan. Most of the business of the coast and interior passes through the hands of agents residing here.

GUAM. See GUAHAN.

GUAMANGA, a city of Peru, in the department of Ayacucho, 220 m. E. S. E. of Lima; pop. 26,000. It stands in a large and beautiful

plain, and is well and handsomely built. It contains numerous avenues adorned with rows of trees, and several spacious and tastefully laid out squares. The principal public edifices are the cathedral, which is a magnificent structure, and the university. The city was founded by Pizarro in 1539. Several years afterward it became the scene of the execution of Almagro's followers.

GUAN, a gallinaceous bird, of the family *cracidae* or curassows, and sub-family *penelopina*; it includes the genera *ortulida*, *penelope*, and *oreophaps*, the first two South American, and the last peculiar to Central America. (For the family characters, see CURASSOW.) In the genus *penelope* (Merrem) the bill is shorter than the head, broad at the base, arched at the tip; wings short and rounded, with the 4th to the 6th quills the longest, and the 1st series arched and narrowed at the ends; tail long, very broad, and rounded at the end; tarsi rather slender, as long as the middle toe; hind toe long and on the same plane with the others; claws short and curved; the sides of the head and front of the throat naked and wattled, the latter capable of inflation. The crested guan (*P. cristata*, Linn.) is the largest, measuring from 2 to 2½ feet in length; the color is a shining reddish green, with rump and belly chestnut, neck and chest white spotted; naked temples violet, and the throat and feet red; the female is of a more reddish tint, with the crest, neck, and mantle bordered with white. The whistling guan (*P. pipilo*, Jacq.), about 28 inches long, is of a violet black color, with a white crest, and white spotted neck, chest, and wing coverts; the female is smaller, with less shining plumage. The marail (*P. marail*, Gmel.) is crested, of a greenish black color, with a yellowish belly, and white spotted chest; it is about 2 feet long. There are several other species described, all inhabiting the central portion of South America. Though the guans have most of the habits of the curassows, they are far less gregarious, being generally seen singly, in pairs, or in small bands; they are more noisy and restless, and have two broods in a year, about January and June; the nests are built in trees, near the origin of large branches, and the young are led and protected as by the domestic hen. They are of mild and peaceable disposition, easily domesticated, breeding in captivity; they have frequently been carried to Europe, and with a little care would make a valuable addition to the farmer's stock of poultry there and in the United States. They perch on trees, descending in search of grains and fruits; they are heavy fliers, but rapid runners, keeping their wings unfolded. In many species the trachea makes remarkable turns on the exterior of the chest, as in the curassows.—The parraquas guans (*ortulida*, Merrem) have the head and throat covered with feathers, or with very slight bare spaces on the cheeks and throat; the bill is higher and more pheasant-like than in the *penelope*. The best known species (*O. katroa*,

Bodd) is about 20 inches long, bronze-colored above, whitish beneath, and reddish on the head; the habits and tracheal peculiarities are the same as in the preceding genus; they prefer woods near the sea coast, and are fond of cultivated fields where they can pick up grains, worms, and insects; the voice is loud and disagreeable, resembling the utterance of their specific name; they are found only in the warm regions of South America.—A curious and handsome bird of this family is the *oreophasis Derbyanus* (Gray), from Guatemala. The base of the bill is covered with velvety black down; the space above the eye is naked, and the forehead is surmounted by a broad, rounded, truncated knob, of a red color; there is a small bare space on the throat. The general color above is greenish black; below whitish, with longitudinal blackish dashes; white band on the middle of the long and rounded tail; bill, legs, and bare spaces red.

GUANACASTE, a district or province of Central America, lying between Lake Nicaragua and the bay of Nicoya. It comprises a broken country, thinly populated, and only adapted for grazing purposes. During the dominance of the Spanish crown, it was under the political and ecclesiastical jurisdiction of Nicaragua; but after the independence, and the establishment of the republic of Central America, it was set off by the federal congress to the state of Costa Rica. The measure was declared to be temporary, and was against the wishes of its inhabitants. On the dissolution of the federation, Costa Rica asserted jurisdiction over it, on the strength of the enactment of congress, but her rights were disputed by Nicaragua. The question led to bitter discussions, until it was settled by a treaty in 1853, in virtue of which the greater part of the district was conceded to Costa Rica, and its name changed to Liberia.

GUANAHANI. See SAN SALVADOR.

GUANAJA. See BAY ISLANDS.

GUANAJUATO, or GUANAXUATO, a state of Mexico, lying between lat. 20° and 21° 49' N., and long. 100° and 102° W., almost entirely upon the great plateau of Anahuac, with an elevation of more than 6,000 feet above the level of the sea; bounded N. by the states of Zacatecas and San Luis Potosi, E. by Queretaro, S. by Michoacan, and W. by Jalisco; area, 12,618 sq. m.; pop. in 1854, 718,775. It is divided into 4 departments, San Miguel de Allende, Leon, Guanajuato, and Zelaya, whose capitals or chief towns bear the same names. The other large cities and towns are Irapuato, San Felipe, and Salamanca. In the Cordillera chain are lofty mountains. Those of the Sierra de Santa Rosa are porphyritic in their character, and present elevations of 11,400 feet above the level of the sea; the highest mountain is that known as the Cerro de los Llanitos, which is 2 leagues N. of the capital. There are 8 rivers, the Lerma, Laja, and Turbio. The first forms the southern boundary of the state, and discharges itself into Lake Chapala in Jalisco.

The others are inconsiderable streams, scarcely deserving the name of rivers. There is also a small lake, Yurirapundaro, 4 leagues long by 1½ in width, the waters of which supply the capital and neighboring towns with a variety of small fish. In the S. portions of the state the lands are very fertile, while the N. plains also yield plentifully. The chief cereals raised are maize, wheat, and frijoles (beans). The vine is cultivated for its fruit alone. The *chili colorado*, or red pepper, so much used in Mexico, is raised in large quantities, and is a considerable article of export, epicures considering that raised in certain districts here as possessing a peculiar flavor and pungency. Efforts have recently been made with success to extend the cultivation of the olive. In some portions of the state are extensive stock farms where large numbers of horses, mules, horned cattle, sheep, and goats are raised. Upon a single estate near San Felipe 30,000 sheep and as many goats are annually slaughtered, chiefly for the markets of Guanajuato and Mexico. The mineral products of the state are valuable, consisting of silver, iron, lead, and copper, the first in the greatest abundance. The chief silver mines are Valenciana, Guanajuato, Villalpando, Monte de San Nicolas, Santa Rosa, Santa Anna, San Antonio de las Minas, Rayas, Malado, Secho, Serena, Comanja, San Luiz de la Paz, San Rafael de los Lobos, El Duranzo, Rincon de Zenteno, San Miguel, and San Felipe. Although some of these mines are just beyond the boundaries of the state, they are all under the jurisdiction of its mint. Soda is found in large quantities in the S. part of the state, and in the N. parts the earth is impregnated with nitre. Mineral waters exist on the S. slope of the Cerro de Cubilete. Warm and sulphur springs are found in Leon, Allende, and Zelaya, all of which are resorted to by invalids. There are manufactories of woollen, cotton, leather, earthenware, &c.; also some for refining sugar. The climate, owing to the great elevation, is mild and pure, and the people do not suffer from extremes of heat and cold. The rainy season is from April to June. The population comprises 3 races, 25 per cent. of whom are whites, 39 per cent. Indian, and 36 per cent. the mixed race.—GUANAJUATO, or Santa Fé de Guanajuato, the capital of the above state, is situated in lat. 21° 0' 15" N., long. 100° 55' W.; pop. in 1854, 63,000. It is irregularly built on hills and mountains, presenting a most singular and picturesque appearance. Its elevation above the sea is 6,869 feet. It possesses many fine edifices, including a cathedral, the church of the Jesuits, with lesser chapels, 3 monasteries, 5 convents, a college, a Bethlehemite hospital, a theatre, a barrack, a mint, and a gymnasium. It has also some very fine private houses, the residences of the wealthy miners. It is in the centre of a rich mining district, in which, within a circuit of 5 leagues, are more than 100 mines, including those of Valenciana, giving employment to 75,000 laborers.



GUANCHES, the aborigines of the Canary islands. The name is derived from *guan*, a word of their own signifying man. They have been extinct since the end of the 16th century, slavery and pestilence having aided the barbarism of the Spaniards in accomplishing their destruction. They are said to have been gigantic in stature and simple and mild in character. They tilled the ground with rude implements, employing bullocks' horns for ploughshares, and for food used barley, wheat, and goats' milk. They believed in a future state, in a good and an evil spirit, and a place of torment for the bad, which they supposed was in the volcano of Teneriffe. They preserved the bodies of their dead and deposited them in catacombs, which are now visited among the curiosities of the islands. They had solemn marriage rites, in preparation for which the brides were fattened on milk. Not more than 150 words of their language are known, and these were long thought to be totally unlike any living tongue, but later researches have traced an analogy between them and certain of the Berber dialects. The origin of the Guanches is disputed. Some regard them as Libyans who fled to these islands on the conquest of Barbary by the Arabs, and this opinion is supported by the similarity of several customs of the Libyans and Guanches. Humboldt supposes them to belong to the races of the old continent, perhaps to the Caucasian, and not, like the rest of the Atlantes, to the nations of the western world.

GUANO (Peruvian, *huano*, manure, spelled by the Spaniards *guano*), the excrement of sea fowl, intermixed with their decomposed bodies and eggs, and the remains of seals, found accumulated upon the islands of the Pacific and coasts of South America, Africa, &c. It was known to the ancient Peruvians as a valuable manure, and the immense deposits of it were an especial object of care to the Incas of that country. Acosta (quoted by Prescott) states that during the breeding season of the birds no one was allowed under pain of death to set foot on the islands where it was produced, and to kill the birds at any time was a like offence. At the time of the discovery of the country by Europeans the islands were called the *Sierra Nevada*, or snowy mountains, from the hills covered with white saline incrustation. Humboldt first drew attention in Europe to the substance in 1804. He described the deposits as covering the granitic rocks of the islands to the depth of 50 or 60 feet, and yet the accumulation of the preceding 300 years had formed only a few lines of this thickness. He procured analyses to be made of the substance by Fourcroy, Vauquelin, and Klaproth, by which it was found to be composed of phosphates of ammonia and lime, with urate and oxalate of ammonia, water, organic matters not determined, and some sand. Sir Humphry Davy alluded to it about the year 1810 as likely to prove valuable to European farmers; and in that year a trial was made of it at St. Helena by Gen. Beaton. But none was brought to Eu-

rope for trial until the year 1840, when 20 casks were imported into Liverpool by Mr. Myers. The next year the shipments amounted to several cargoes. The exclusive right of digging and shipping guano for the term of 9 years was sold at this time by the Peruvian and Bolivian governments for the sum of \$40,000; but the contract was soon after repudiated by the former, as the increasing demand for the article developed the immense value of the deposits. The monopoly was soon after revived, however, Messrs. Gibbs and son of London becoming the agents of the Peruvian government, and sole importers of the article into Great Britain, and Messrs. Barrera, brothers, for the United States, until succeeded by Messrs. Zazacondene and co. Upon the 3 small islands called the Chincha islands, off the S. coast of Peru, it was estimated that there were about 40,000,000 tons, the largest one having no less than 17,000,000 tons. The Lobos islands off the N. coast also contained enormous deposits, and many smaller islands were covered with it. Upon the principal Chincha island the deposit is stated to attain a thickness of 160 feet, or even more. The exports from these localities rapidly increased, so that guano became an important article of commerce, and vessels returning from the Pacific to England or the United States now found a profitable return cargo at the Chincha islands, instead of going as heretofore to China and the East Indies in search of one. The revenue to the Peruvian government from this trade exceeded that from all other sources; and its agents reaped enormous profits from their authorized commissions upon the shipments. The demand led to explorations in other parts of the world, and other deposits were found, but nearly all inferior in quality to those collected upon the rainless islands off the coast of Peru. Upon these the ingredients have remained little changed in the dry atmosphere, and under the tropical sun. The uric acid and ammonia, both products particularly subject to ferment and decompose in the presence of moisture, remain unaltered, except as they become dry and are locked up in the coarse brown powder produced from these and the other ingredients of the excrement. So the nitrate of soda and common salt, both deliquescent in a moist atmosphere, are found as a dry deposit among the parched sands of the desert of Atacama in the same rainless district. (See AN-DEA.) In localities subject to rains these valuable nitrogenous compounds disappear, and the value of the guano consists principally in the next useful ingredients, the phosphates, which remain. Next to the Chincha islands the most important are those belonging to the American guano company of New York, upon Jarvis, Baker's, and Howland's islands, situated as follows: the first in lat. 0° 21' S., long. 159° 53' W.; the second in lat. 0° 15' N., long. 176° 21' W.; and the third in lat. 0° 50' N., long. 176° 53' W. The deposit on Jarvis island is estimated at 3,500,000 tons, and that on Baker's island at 2,500,000

tons, while that on Howland's has not been calculated. The amount obtained in 1858 was about 15,000 tons, all for American soil as required by the American government. The arrangements of the company now enable them to load 135 tons a day from Jarvis island. They have constructed a railroad upon this and upon Baker's island, by which mules draw the guano to boats which take it to the ships that are moored to large "can" (iron) buoys stationed off the shore. About 100 men, including two chemists, are constantly employed. The market for the guano is chiefly in the middle and southern Atlantic states. In 1860 the company will be able to import no less than 100,000 tons. The following table shows the exports from the Chincha islands from the commencement of the trade to Dec. 1857, under different contracts:

Date.	No. of registered tons exported.	Markets.
1841.....	6,500	England.
1842-47.....	126,904	England.
1847.....	40,285	England, France, and U. S.
1849-51.....	100,835	"
1849-49.....	5,184	England and Italy.
".....	9,318	England.
".....	5,000	United States.
1850-57.....	495,341	United States.
1849-53.....	280,968	England and Europe.
1850-53.....	16,846	United States.
".....	841	France.
1852-57.....	1,172,255	England, Europe, and Australia.
".....	145,404	France.
1852-56.....	48,247	Spain.
1852-56.....	24,586	Mauritania.
".....	3,081	China.
1853.....	359	Costa Rica.
1851-57.....	4,198	China and India.
".....	20,000	Not specified.
Total.....	2,457,977	

In 1857 the trade was thus represented:

Vessels.	Countries.	No. of tons registered.	Vessels.	Countries.	No. of tons registered.
301	United States..	518,928	6	Mecklenburg..	2,280
290	Great Britain..	206,152	8	Denmark.....	2,917
37	France.....	20,636	5	Peru.....	2,501
25	Sweden.....	12,681	2	Chili.....	1,425
19	Hamburg.....	9,924	1	Oldenburg....	1,500
23	Belgium.....	8,956	3	Essna.....	1,724
9	Sardinia.....	4,073	4	Prussia.....	2,043
1	Holland.....	480	1	Hanover.....	160

—The composition of guano is exceedingly complex. The following minute analyses of South American samples were communicated by J. Denham Smith to the chemical society, and published in vol. ii. of their "Memoirs." Nos. 1 and 2 were in the state of powder; the others were of the concrete variety.

Constituents.	Anguian.	Peruvian.	Isaboa.	Bolivian.		Latham Island.	Saldanha bay.	Australian.	Patagonian.	Chilian.
				Government.	Inferior.					
Water.....	12.86	18.78	18.89	16.44	14.15	24.96	21.08	18.20	20.61	14.89
Org. matter and ammoniacal salts.....	59.92	58.16	52.49	12.98	26.14	10.96	14.38	12.77	19.79	16.81
Phosphates.....	17.01	28.43	19.63	56.09	23.18	54.47	56.40	44.47	80.66	26.90
Sulphate of lime.....	.....	.....	.....	.....	9.65	2.39	.....	4.55	1.80	.....
Carbonate of lime.....	.....	.....	.....	.....	12.87	2.90	.....	8.82	8.06	10.28
Alkaline salts.....	7.90	7.97	8.89	11.88	5.97	4.06	6.10	7.84	7.01	6.84
Sand.....	8.51	1.66	6.73	2.81	8.09	0.51	1.54	7.85	17.04	14.26
Total.....	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ammonia.....	21.10	17.50	10.43	2.57	3.26	1.26	1.63	1.01	2.09	1.43
Phosphoric acid in alkaline salts.....	1.90	2.50	.....	8.11	.....	.....	.....	.....	8.00	.....

Constituents.	1.	2.	3.	4.	5.
Soluble in cold water.					
Water.....	222.00	215.00	204.20	106.66	77.00
Muriate of ammonia.....	25.50	35.22	.....	4.43	80.80
Sulphate of potash.....	80.00	.....	.....	.....	.....
Sulphate of soda.....	trace	87.90	269.44	12.23	191.77
Oxalate of ammonia.....	74.00	100.88	93.90	.....	.....
Oxalate of soda.....	.....	.....	.....	.....	106.68
Phos. of ammonia.....	68.20	30.06	61.24	trace	.....
Phosphate of lime.....	.....	12.56	.....	.....	.....
Phosphate of potash.....	.....	20.02	77.82	14.94	49.47
Phosphate of soda.....	.....	85.82	.....	.....	3.60
Chlor. of potassium.....	.....	.....	.....	.....	41.68
Chloride of sodium.....	.....	.....	29.22	9.50	266.81
Organic matter.....	15.00	61.74	6.68	2.40	25.58
Soluble in boiling water.					
Urate of ammonia.....	154.18	25.12	.....	.....	.....
Uric acid.....	25.16	.....	.....	.....	.....
Phos. am. and mag.....	5.64	4.04	7.94	.....	1.83
Phosphate of soda.....	1.20	1.28	.....	trace	.....
Phosphate of lime.....	1.26	2.88	.....	11.87	1.10
Organic matter.....	11.18	6.88	8.60	10.00	7.56
Insoluble in water.					
Oxalate of lime.....	25.60	107.26	109.58	.....	.....
Phosphate of lime.....	197.50	192.00	62.70	664.47	181.18
Phos. of magnesia.....	20.30	19.84	8.74	80.56	25.50
Humus.....	25.26	90.80	8.62	.....	.....
Organic matter.....	.....	11.40	.....	29.73	.....
Water.....	84.56	42.42	49.74	80.60	18.86
Sand, &c.....	15.60	16.48	7.90	20.48	4.20
Ox. iron and alumina.....	.....	.....	.....	.....	1.50
Loss, &c.....	0.44	1.50	4.93	2.63	.....
Total.....	1,000.00	1,000.00	1,000.00	1,000.00	1,002.22

For commercial purposes it is of no importance to enumerate all the compounds. The approximate value of samples can be arrived at in the following manner. Multiply the values named below by the per cent. found of each ingredient; the sum obtained will represent the value of 100 tons of the guano. Thus for the nitrogen found the rate per cent. is \$370, or if, instead of this being separated, the ammonia is estimated, the rate is \$300; for phosphate of lime the additional amount is \$40; soluble phosphate of lime, \$120; organic matter, \$5; alkaline salts, \$5; sulphate of lime, \$5. Example of sample of first class Peruvian guano:

	Per cent.
Moisture.....	15.10
Organic matter.....	51.27 × \$5 = \$256.35
Silica.....	2.90
Phosphate of lime.....	23.18 × 40 = 925.20
Phosphoric acid.....	3.23
Alkaline salts.....	6.07 × 5 = 30.35
	100.00

Soluble phosphate of lime, equivalent to the phosphoric acid above..... 7.00 × 120 = 840.00  
Ammonia derivable from the organic matter above..... 16.43 × 300 = 4,929.00

Value of 100 tons.....\$6,987.90

The following are forms and examples of ordinary commercial analyses:

The following three analyses of Jarvis island and one of Baker's island guano are by Prof. John C. Draper of New York :

Constituents.	Jarvis isl'd.		Constituents.	Jarvis island.	Baker's island.
Water .....	90.00	17.50	Water .....	7.50	4.50
Org. matt'r and ammon' salts	3.00	4.00	Organic matter	4.00	11.00
Phosphates ...	31.00	30.00	Soluble salts ...	2.50	7.00
Sulph. of lime	52.00	44.50	Sulph. of lime	5.00	76.00
Alkaline salts..	4.00	4.00	Phos. of lime...	81.00	...
			Carba. & silica	...	1.50
Total .....	100.00	100.00		100.00	100.00

Analyses and calculations like those given ought to be made in entering upon all large purchases of guano, as well on account of the great natural differences in the qualities of the various kinds, even from the same locality, as of the gross adulterations which are largely and most ingeniously practised; substances of no value as fertilizers being intermixed with the genuine article, so as to very materially reduce its value. Full half the guano sold in England is stated to be thus deteriorated. The analyses, moreover, are of importance, as they indicate the most advantageous methods of applying the guano—for what crops and for what soils they are best adapted. But for the knowledge of their composition thus acquired, the best Peruvian guano, rich in ammonia, might be extravagantly employed upon soils that would be almost equally benefited by the cheaper qualities, of which the phosphates are the chief fertilizing ingredients. Upon light soils especially, the ammoniacal guano may be used to waste, owing to the little obstruction they present to the escape of its volatile and very soluble portions; the full benefit of these will be secured only in the strongest soils, or in composts prepared with the view of their absorption and retention. In such mixtures guano is used most advantageously. Of itself alone it may furnish all the ingredients required by the plants; but its activity and evanescence need to be checked, and on account of its caustic quality care should be taken in its use, that it be not brought in direct contact with the seed. The quantity of best guano that should be employed to the acre is generally rated at from 3 to 5 cwt.; and the time of its application should be in wet weather, when the rains diffuse it equally through the soil. The Peruvians, it is said, are accustomed to irrigate immediately after applying it. They use it for two crops only, Indian corn and potatoes, burying about half a handful near each root when the plants are perhaps half grown, and adding some water "to fix the guano." In this country it is found to be an excellent top dressing for grass and young corn, and is a most efficient manure for all the root crops. Full details respecting the guano trade and the use of guano are contained in the documents accompanying the message of the president of the United States to the senate, Feb. 5, 1859. —The search for new localities of guano led to the discovery in 1855 of animal deposits of the same original nature upon the groups of

islands in the Caribbean sea, lying off the coast of Guiana and Venezuela. Immense flocks of sea fowl frequent these islands for the purpose of laying their eggs. But being in the region of the tropical rains, the deposits of excrement and other organic matters are subject to chemical changes, from which result singular products, very different from those of the earthy guano of the dry islands of the Pacific. The principal groups which furnish these products are Los Monges (Monks' island), El Roque, and Centinella. Some of the islands are low, and strewn with sand, which is made up of comminuted coral, madrepore, and shells, in which the birds lay their eggs. Others rise in peaks to the height of 800 feet, and upon these are stratified rocky layers of metamorphic guano, sometimes covered with the deposits still in process of accumulation. Several qualities of guano are recognized, one of which is arenaceous, in grains as coarse as mustard seed, of light yellowish brown color or nearly white when dried, exhaling an odor not ammoniacal, but like that of freshly dug earth. Its average composition is thus stated by Dr. A. A. Hayes: moisture, after drying, 4.40; organic matter, 6.40; bone phosphate of lime, 46.60; carbonate of lime, 59.80; phosphate of magnesia, 1.30; sulphate of lime, 0.80; sand, 0.31; traces of chloride and sulphate of soda; total, 99.41. The ammonia or nitrogen in the organic matters does not exceed 2 per cent. of the whole. Another variety is in aggregated grains, the first step in the change of the material into rock. It differs in composition from the preceding principally by loss of carbonate of lime, and increased proportion of bone phosphate. A third variety is a solid rock, which forms a crust sometimes 2 feet thick over the lower portions of the deposit, and is the product of the change that has taken place upon the surface of the mass. Its composition is somewhat variable at different localities; but it is everywhere distinguished by the disappearance of carbonate of lime, and large increase in the proportion of phosphate and sulphate of lime. The carbonate of lime has been decomposed by the acids generated in the fermentation induced by the moisture at the prevailing elevated temperature, and with other soluble matters has been removed by the rains. The passage of the gaseous exhalations through the mass, gradually thickening as its aqueous portion evaporates and the salts gather at the surface, renders its structure porous and cellular, and so much like that of some trachytic rocks that the substance has been mistaken for one of igneous origin, or at least metamorphosed by heat. The granular structure has given place to a compact, close texture, and a mineral appearance and hardness closely approaching that of feldspar; and in some specimens are observed angular fragments and grains hardly to be distinguished by the eye from epidote. The external surface has an uneven weathered appearance like that of trap rock, and is of a lighter color than the body of

the rock within. Various analyses have been made of this substance by different chemists, and it is found to consist principally of phosphoric acid and lime, the former generally ranging from 37 to 46 per cent., and the latter from 39 to 41 per cent., of which a small portion is combined with sulphuric acid to form sulphate of lime, the proportion of this sometimes exceeding 8 per cent., and the crystals being visible in the cells of the mineral. Water and organic matters sometimes exceed 10 per cent. In the body of the rock the phosphoric acid is found combined with two atoms of base and one of water, in the form of common phosphate of lime; while the external part is a combination of an atom of acid with 8 of lime, forming the so-called tri-phosphate of lime. The acid is also sometimes combined in small proportion with iron, alumina, and magnesia. Soda is present in some samples to the amount of 2 or 3 per cent. Much of the guano rock closely resembles in appearance the phosphate of lime rocks of the older crystalline formations; and it affords a remarkable instance of the conversion of modern collections of organic substances into what appears to be an ancient rock. Though traced directly into the mass of these substances with which it is associated, and the derivation of which is obviously from the digested bones of fishes and other food of birds, from comminuted shells, and the remains of the birds themselves and of their eggs, all vestiges of animal life have as completely disappeared in the hard strata as they have from the true metamorphic rocks, the changes in which we have been accustomed to ascribe to intense heat produced under the pressure of superincumbent mountains of rock, and exerted through long and indefinite periods. Here in the light of day recent deposits are thus metamorphosed into crystalline masses by silently progressing chemical changes induced by the heat and moisture of the tropics.

**GUARANTY.** This word is derived from the old English word *warrant*. The Latin and the Norman French languages, not having the letter *w*, in spelling this word and many others used the letter *g* instead of *w*, as in the name Wilhelm or William, which is in Latin Guilielmus, and in French Guillaume. Thus the barbarous word *guarantio* came into use in law proceedings, although the even more barbarous word *warrantio* was also used. Gradually the words became distinguished in their meaning; and at present it is found very convenient to use the Latin form *guaranty* in one sense, and *warranty* in a different although an analogous meaning. A *guaranty* is a promise that some other party (who is called the principal) shall pay a debt, or discharge some duty, or perform some act; and to answer for the consequences if the principal fails to do what is thus promised. It is an extremely common business transaction; and we shall endeavor to give the principal rules by which it is governed.—Every indorser of negotiable paper is in fact a guar-

antor; but in such a peculiar way, that the law attaches to him duties on the one hand, and on the other gives him rights, not known to common guarantors. (See **INDORSEMENT**, and **NEGOTIABLE PAPER**.) So, too, every surety is a guarantor, and the law for guarantors and for sureties is in many respects similar, but in other respects it is different. (See **SURETY**.) In the first place, we may remark that a guaranty is not in general negotiable; by which is meant that it cannot be transferred in such a way as to give the transferee the right of suing upon it in his name, or, if this be permitted, of suing with all the rights and advantages of an original holder. In the next place, although it is a promise only to pay the debt of another, the guarantor may be held, although the promise of that other was voidable by him who made it, and could not be enforced at law; as if it were the promise of an infant, and not for necessities, or of a married woman. In fact, guaranties are very often taken for the very reason that the debt or promise guaranteed is one which has no value by itself. But generally, the liability of the guarantor is measured and determined by that of the principal, or the party whose debt or promise is guaranteed. No especial words or phrases or form of instrument is necessary to constitute a guaranty. The intention must be manifest, and the words must be such as may be construed into an expression of that intention; and this will be sufficient. The contract of guaranty is one which is construed, if not severely, at least exactly. Thus if A guarantees the notes of B, he is not bound for notes which B signs jointly with C; and if B changes his business or the nature of his debts, so as to throw upon A a liability distinctly different from that which it was his intention to assume, A is thereby discharged from his guaranty.—The guarantee (or party guaranteed) must preserve all the securities he has of the principal debtor unimpaired, because if the guarantor pays the debt, he is entitled to all these securities; and a court having equity powers will, upon cause shown, compel the guarantee to do what he can to turn these securities to account for the benefit of the guarantor, if the guarantee alone can do it, or can do it to the most advantage, before it will permit him to call upon the guarantor. Indeed, it may be regarded as a fundamental proposition of the law of guaranty, that the guarantee shall act with entire fairness toward the guarantor, and shall do all that can properly be done to lessen his burden. Therefore if the creditor, being guaranteed, agree with the principal to reduce his debt in any certain proportion, he shall be understood to make the agreement for the guarantor's benefit as much as for his own, and therefore the guaranty shall be reduced in the same proportion. Still, however, it seems to be generally held that the guarantor's right is confined to the securities for the debt, and does not extend to the debt itself; if therefore a guarantor pays a debt, it is said that he has no right to

demand from the creditor a transfer of the debt itself, or of the note by which the debt was evidenced, for the reason that this very debt has been already paid or discharged by himself, as guarantor. But he may demand, with the securities, the note itself, or a transfer of the debt, if this be necessary to make the securities available; and it would be difficult to resist his right, we should say, to be subrogated to the creditor's claim, so far as he could make that available to himself. But the law on this point can hardly be considered as distinctly settled.—The promise to pay the debt of another, like every other promise known to the law, must rest upon a good consideration, or it cannot be enforced by legal process. The law on this subject is a little nice in respect to guaranties; for while it demands inexorably that there should be a consideration, it sometimes declares that if the promise which is guaranteed rests upon a good consideration, this same consideration shall be sufficient to sustain the promise of guaranty. On the other hand, it sometimes holds that the consideration of the original promise, however valid, has no force or effect in relation to the promise of guaranty. In general, the distinction is made thus: if the original debt and the guaranty were simultaneous, or so connected that they may be deemed parts of one transaction, then the consideration of the original debt is a consideration also for the guaranty. Thus, if A goes with B to C, and says to C: "Sell to B \$1,000 worth of goods, and I will guaranty the payment," and the sale is made, and the debt incurred, and the guaranty given, the sale is a good consideration for both the debt of B and the guaranty of A. But if A goes to C, perhaps taking B with him, and says: "You sold B \$1,000 worth of goods, and he tells me you are a little uneasy about it; I now tell you I will guaranty the debt, and give you this writing in which I so promise," this guaranty is worthless, because the original consideration of the sale is now executed and past, or, in the language of the law, is exhausted, and has no force or application whatever to the new and distinct promise of guaranty. So if A says: "If you will hereafter sell to B, I will guaranty his payments," then, as soon as the sale is made according to the terms offered, it becomes a good consideration for the previous guaranty. It should be remembered, that to make this consideration sufficient, it is not necessary that any thing shall pass directly from him who receives the guaranty to him who gives it; for if the party for whom it is given, or the party by whom it is given, receive any benefit, or the party to whom it is given suffer any loss or injury, from or by reason of the promise of guaranty, it is a good consideration. The guarantee must conduct himself in all respects with entire good faith, and if there be any taint or fraud about the consideration—as, for example, if a guaranty is given for a certain amount of goods sold, and the seller has made an arrangement with the

buyer whose debt is guaranteed, by which arrangement the buyer is to pay him more than the true price, the difference going toward an old debt due from the buyer to the seller—this is a fraud upon the guarantor, and he is discharged not only as to this unfair excess, but as to his whole promise of guaranty.—A guaranty, being a promise to pay the debt of another, is precisely within the clause of the statute of frauds which requires that such a promise be in writing and signed by the guarantor. It often happens, however, that a guaranty, or a contract which has all the appearance of a guaranty, and which is not in writing, is still enforced by the courts. This occurs when they can hold the promise to be an original promise, and not a collateral promise. For an original promise is a promise to pay one's own debt; while a collateral promise is a promise to pay a debt which is primarily the debt of another. This is a very nice and difficult question, and has been very variously decided. The disposition of the courts so to construe and apply the statute of frauds as that it shall not be an instrument of fraud, has led them to some strange decisions. Comparing the cases, and drawing from them the true principle which must govern the question, we should say the rule must be thus: if one who promises to pay the debt of another receives an independent consideration for his promise, and thereby enjoys a benefit or advantage which is entirely his own, and which he would not have enjoyed but for the transaction, then the promise is to be regarded as his promise to pay his own debt, and therefore needs not to be in writing. As an illustration of this question, which is frequently recurring and always difficult, we should say that if the creditor had attached the property of the original debtor, and the alleged guarantor had requested that the attachment might be discharged and agreed to pay the debt if it were, and the attachment was then discharged and the property set free, this would not be enough to make it the guarantor's promise for his own benefit, or his original promise, and therefore it could not be enforced, unless it was in writing. But if the alleged guarantor had requested not only that the attachment should be discharged, but that the property should be delivered over to him for his own advantage, this new element would make his promise one for his own benefit, or, in the language of the law, an original and not a collateral promise, and therefore it needs not to be in writing. So, if A delivers goods to B, at the request of C, who is to pay for them, and who may be considered as the buyer of them, C, when he promises to pay for them, promises to pay his own debt, and therefore the promise may be in spoken words only. But if A sells goods to B, on C's promise to pay for them if B does not, then A's promise is only collateral to B's, and it must be in writing. The question therefore is, were the goods sold to C for the benefit of B, or were they sold to B on C's guaranty? On this question the seller's entry

in his books is sometimes very important evidence. If he charges O with them primarily, this may not go far to bind O, because he may have charged them so for the very purpose of holding O. But if he charges them simply to B, it will be very difficult for him to prove afterward that he considered himself as selling them to O, and not to B on O's guaranty. But still he might show that even this entry was made by mistake, and did not represent the truth.—The contract of guaranty, like every legal contract, requires two parties, who agree to the same thing. It follows therefore that a guaranty, or a promise to pay the debt of another, is not valid until it is accepted; and this is true, whatever be the consideration, and whether it be in writing or otherwise. But this acceptance need not be direct and unequivocal; indeed, it need not be in any words whatever; it may be implied from circumstances. Thus, if A goes with B to C, and says to C: "If you will sell B the goods he wishes, I will see that he pays you the price," and C, without reply to A, turns to B and sells and delivers him the goods, there would be no question in this case as to whether C accepted and acted upon the guaranty of A. It is under a different class of circumstances that this question generally arises. Thus, if the guaranty be by letter, and refer to subsequent operations, the question would then arise whether there was a sufficient acceptance of it. Some courts have asserted that the guarantor had a perfect right to know whether his offer was accepted, and whether he stood bound as guarantor; and some have gone so far as to hold that the guarantor was entitled to know at once, not only that his guaranty was acted upon, and the amount, but all the terms of the sale which it could be desirable for him to know, that he might arrange accordingly. On the other hand, courts of the highest authority have held, that where an offer of guaranty is absolute, and does not expressly or by distinct intimation call for any acceptance or any special information, the party making the offer might suppose it to be accepted and act on that supposition; and the party receiving the offer may act under it and within the terms of it, and hold the guarantor without giving him any notice of his acceptance. This seems now to be the settled law of New York. Where notice of acceptance is necessary, there is no prescribed form or time for it; but it must be such as imparts the necessary information in such season that the guarantor may lose no right or means of protecting himself.—It has already been said that the party receiving the guaranty must conduct himself with good faith and proper care toward the guarantor; and one effect of this principle is, that if any material change is made in the extent or the terms or character of the liability of the principal, this discharges the guarantor. Nor will a guarantor be held in such case by the party guaranteed showing that the change was in no way injurious to the guarantor; because he has a right to

judge for himself as to the circumstances under which he is content to be liable, and he may stand upon the precise terms of his contract. Even if the change in the circumstances of the guaranty be caused by the operation of law, and not by the act of the party guaranteed, the guarantor is still discharged. But this rule applies rather to the case of sureties. The guarantor may, however, assent to such a change, and then he will be held. Thus, if a new note be given for an old one, this discharges the guarantor on the old note; and it has been held that if a guarantor thus discharged, in ignorance that his liability has thus terminated, makes a new acknowledgment of this liability, he cannot be held thereon. So, a guaranty to a partnership is discharged by a change in the partnership, although no change in the firm or style of it be made; and this has been held, where the guaranty was given "for advances made by them, or by either of them." The reason given is, that the guarantor may have trusted to the skill or care of the members of the firm as they stood when he gave his guaranty; and the change of a single member may be important in this respect. It should be stated, however, that the guaranty itself may provide expressly for all these changes, and will not, of course, be affected by any which it anticipates.—Whether a guaranty be a continuing guaranty, or be intended to cover one single transaction only, is sometimes a difficult question. In general, however, a guarantor who intends to limit his liability to a single transaction should so express it; but if it can be gathered from the terms of the guaranty that it was intended and should have been understood to apply to more than one transaction, it will be so held. The limit may be one of time, as to be liable for any amount of goods sold before a certain day; or one of amount, as for any goods up to a certain sum.—That a guarantor is entitled to a reasonable protection we have already seen, but it has been much disputed whether, on this ground, he may insist that the party guaranteed shall proceed forthwith against the debtor. It would seem to be very unjust to the guarantor to permit a creditor to let his debt lie without taking any steps to secure it, because he knows that the guarantor is perfectly responsible, and he chooses to indulge some feeling of personal kindness to the debtor. This question has frequently come before the courts, especially in New York; and it must be admitted that the law is not quite certain. We think, however, that this rule may be drawn from the best authority, and sustained by strong reasons, viz.: that the guarantor is not discharged by mere delay of the creditor in calling on the debtor; but if after a request from the guarantor that he should proceed (especially if the request be accompanied by an offer to pay the costs of proceeding), the creditor delay the demand and all proceedings so long and so stubbornly as to indicate great negligence if not fraud, and the guarantor can show that by such

delay he has lost the means of indemnifying himself, the guarantor is now discharged, at least to the extent of the injury which he can show that he thus received. Nor is a creditor prohibited from giving to his debtor all indulgence whatever. He certainly may favor him in some respects without discharging the guarantor. After some fluctuation the law seems to have settled down upon the following rule: mere forbearance of the debt, without fraud, does not discharge the guarantor; nor does an agreement to forbear, provided this is not so binding on the creditor as to prevent his suing the debtor at any time. That is, the creditor must retain the power of putting the debt in suit at any time; but if he retain this power, any forbearance consistent therewith does not discharge the guarantor. The reason is, that the guarantor has the right of paying the debt at any time after it is due, and so acquiring the right of suing it at once; and if the creditor destroys this right by putting the debt in such a condition that it cannot be sued at once, he deprives the guarantor of a valuable right, and so loses his hold upon him. Thus, where a creditor received interest for 60 days in advance, this did not discharge the guarantor, because, although it undoubtedly signified that the debt was to lie 60 days, it did not take away the creditor's power of suing it at once; and therefore no bargain for indulgence or delay discharges the guarantor unless it be such a bargain as would operate as a complete bar to an action; and no mere covenant not to sue within a limited time has this effect, because a suit may be begun at once, in violation of the agreement, leaving the debtor to his action for damages. Reasonable notice should also be given to the guarantor of the failure of the debtor, so that he may have all proper opportunity of obtaining indemnity. But what this reasonable notice should be is not quite settled. There is no time fixed, as in the case of indorsed paper, within which the notice of non-payment must be given; and perhaps the rule may be stated that no mere delay of notice would discharge the guarantor, unless he can show that he has suffered injury by such delay. But if he can show that if he had received this notice within a day or two from the time when the debt was unpaid, he might then have secured himself, and has now lost the opportunity, even that delay might suffice to discharge him.—Guaranties are sometimes given by one expressly in an official capacity as trustee, church warden, executor, assignee, and the like. But the guarantor is still held personally on this guaranty, unless, 1, he holds that office, and, 2, has a right by virtue of the office to give the guaranty in his official capacity.—Every guaranty may, in general, be revoked at the pleasure of the guarantor, by giving due notice to the party guarantied, unless, 1, the guaranty is given upon some continuing consideration which is not yet exhausted, and cannot be restored or rescinded; or, 2, upon some specific transaction, which is

not yet wholly completed; or, 3, the guaranty is against the misconduct of some servant or officer, whom the guarantee cannot at once dismiss, or secure himself against by other means, if the guaranty be rescinded.

GUARD, a military term, signifying a portion of an army or garrison whose duty it is to watch and defend the post or the main body of the troops from surprise, and also to repress disorders. The advanced guard, or vanguard, is a detachment which on the march precedes the main body; the rear guard is that which protects the rear of the army on a march. The main guard is the principal guard in a fortified place, and from it the other guards are generally detached.

GUARDIAN, one who guards, or has the care and charge of another. Guardians in law are of many kinds. There are guardians of minor children, and of those incapacitated otherwise than by age from taking care of themselves. Guardians of infants (minors) were, at common law: 1. Guardians by nature. In exact and technical construction, by this term is meant only that guardianship which belonged to the ancestor, in respect to the heir apparent. It extended only to the care of the person, and did not include the care of the property. 2. Guardians by nurture. This guardianship also extended only to the person, and not to the estate; and it terminated when the ward was 14 years of age, whereas guardianship by nature continued until the ward was 21. It was given to the father, and if no father, to the mother. 3. Guardians in socage, limited to cases where the minor had lands by descent; and this guardianship extended over these lands and the person also, until the ward was 14 years of age. It fell by common law to the next of blood to whom the inheritance could not descend, and therefore this kind of guardianship could hardly have existed in the United States. 4. Guardians by statute; and 5, guardians by will, or testamentary guardians. These last two are almost the only ones known practically in this country (by statutes following that of 13 Charles II.), whereby a father has power to appoint by will a guardian for his minor children; and if such appointment be not made, or fails, the court of probate, or some other court exercising similar powers, makes the appointment. The statutes of different states make somewhat different provisions as to the persons to be appointed (usually the next of kin of proper age), the degree and way in which the minor is to be consulted, the bonds to be given, and the power and the duty of the guardian.—All guardianship is a personal trust, and is therefore not transferable by assignment, devise, or inheritance. Whether it expires by the marriage of a female ward who is still a minor is not certain, but, we think, probable. It seems that as to a male ward marrying, the distinction has been taken that it terminates the guardianship as to his person, but not as to his estate. The law can hardly be said to be settled in the United

States generally as to the effect of the marriage of the ward. The marriage of a female guardian terminates her authority in some states by statute, and in others, generally at least, by practice. A married woman cannot be appointed guardian without the consent of her husband; but with that consent she may be.—The guardian has very full power over the personal estate of the ward, but very little over the real estate, any further than relates to the rents, issues, and profits, and to necessary law proceedings. He cannot dispose of the real estate generally, without an order from a court having jurisdiction, and can lease it only for the minority of the ward. Generally, in the United States, it is more proper and more safe for a guardian to get the authority of a proper court, before even converting the personal property of an infant into real estate, and certainly before attempting any transfer, or any burden of the real estate. In some of the states there are general statutory provisions as to investments which guardians and others in trust may or may not make. The guardian is not permitted to make any profit out of the ward's property, or to use it in his own business or speculations; nor can he act for his own especial advantage in any transaction relating to the property of the ward. If he makes a beneficial bargain about the property or interests of the ward, the whole of the benefit must be transferred by him to the ward's estate. If he cause or suffer any waste or damage to the ward's property, he must refund in full damages, and in some states in treble damages. And in settlement of his accounts, a court will sometimes charge him with compound interest, where it seems that he has himself been deriving from the use of the ward's property a profit equal to that. So if he uses his ward's property in his own business, the court will decree to the ward all the capital, with all the profit it has made, if this be more than interest; or if it be less or none, it will decree the capital with interest (which may be made compound if the court see fit), because it was the duty of the guardian to invest the property so that it would earn this safely. If he promises, on sufficient consideration, to pay the debt of his ward, he is personally bound, although the ward's estate fails to pay the debt, and he described himself as guardian, unless it was a specific part of the contract that he should be held only so far as the funds suffice, or that he should not be held personally; and if he discharges the debt of his ward lawfully, he may charge it against the ward in his accounts, or, if he be deprived of his guardianship, or the ward become of age, he may have his action against the ward for the amount. If the ward enter into a contract or make a promise, the guardian cannot be sued thereon, but the action must be brought against the ward; and the guardian may make any lawful defence for the ward.—Beside the general guardian (whether he be appointed by will or by the court), it is common for courts to appoint a guardian *ad li-*

*tem*, to represent and act for the ward in the settlement of the guardian's accounts, or in or for any other legal proceedings, where it seems proper that such appointment should be made. Guardians are also appointed generally in the United States for the insane and for spendthrifts. The manner of the appointment is regulated everywhere by statute; and the general principles already stated in reference to guardians of infants are equally applicable to other guardians, with such changes only as the difference in the nature of the case may make necessary.

GUARDIOLA, SANTOS, president of the republic of Honduras, born in the city of Tegucigalpa in 1812. He entered the army at an early age, and soon achieved a remarkable reputation for daring and cruelty. He took an active part in the civil wars which attended the breaking up of the republic of Central America, and from his rigor and barbarism obtained the designation of the "Tiger of Honduras." He endeavored to overthrow the government of his native state in 1850, but was defeated and banished. He remained in exile until 1856, when he joined the Nicaraguan forces in the capacity of general of division. Defeated by Walker, and subsequently by General Muñoz, with inferior forces, he abandoned Nicaragua and returned to Honduras, where, by a revolutionary movement, aided from Guatemala, he was raised to the presidency. Since his accession to power he has been moderate in policy. His attention seems now to be directed rather to the development of the resources of Honduras than to obtaining military distinction.

GUARDS, a select body of troops whose duty it is to protect the person of the king, emperor, or other ruler, or to defend the sovereign's residence. The term is also now applied to a large body of troops distinguished from the rest of the army by better dress and higher pay, and by generally superior rank and character. The institution of guards for the protection of the sovereign is of the most remote antiquity. We read in the Bible that Potiphar, the Egyptian to whom Joseph was sold, was captain of the guard of Pharaoh (Gen. xxxix. 1); that King David made Benaiah commander of his guard (2 Samuel xxiii. 28); and that King Rehoboam committed the brazen shields which he had made "into the hands of the chief of the guard, which kept the door of the king's house" (1 Kings xiv. 27). From Jer. lli. 12 we learn that Nebuzaradan was captain of the guard of the king of Babylon; and from Daniel ii. 14, that, at a later period, Arioch held the same office. Herodotus states that from each of the two classes into which the Egyptian army was divided 1,000 men were annually selected to serve as the body guard of the king. The Persian monarchs maintained a mounted body guard of nobles who were called the king's kinsmen, and also a corps of foot guards magnificently armed and attired. Alexander the Great imitated them in this respect, and the modern kings of Persia



continue the custom. In 1855 the body guard of the shah consisted of 2,500 irregular cavalry, beside a corps of disciplined infantry.—The most celebrated guards of antiquity were the Roman prætorians. They were originally during the republic a select cohort that attended the prætor, or commander of an army. The emperor Augustus constituted them his body guard, and augmented their number to about 10,000 men. He gave them double pay and superior privileges, but kept only 8 cohorts at the capital, the rest of the force being divided and stationed in various cities of Italy. Fifty years later Tiberius assembled the whole of them at Rome, where they were established in a permanent fortified camp, close to the walls of the city on the Viminal hill. Under the earlier emperors the prætorians were picked men, and mostly Italians. Their turbulence and crimes became intolerable, and after they had deposed and elevated several emperors, and even put the empire up for sale to the highest bidder, they were disgraced and disbanded by Septimius Severus in 193. A few years later, however, the same emperor reconstituted them, with a new organization, and increased their number fourfold. Diocletian in 303 reduced their numbers, abolished their privileges, and transferred their special duties to two Illyrian legions of imperial guards, each 6,000 strong, whom he called Jovians and Herculians. The prætorians, however, were soon restored in numbers and privileges by Maxentius, in whose defence they fought with desperate valor against Constantine at the battle of Saxa Rubra, where Maxentius was defeated and slain in 312. Constantine, immediately after his victory, suppressed the prætorians utterly, destroying their fortified camp, and dispersing the individual members of the corps among the common legions of the army.—The Byzantine emperors, as early as the 10th century, surrounded themselves by a guard of Varangians, Scandinavian adventurers, who came first through Russia, and were kept up by recruits from Denmark and from England. Scott gives a graphic picture of these mercenaries in his "Count Robert of Paris." They were armed with broad and double-edged battle-axes, which they carried on their shoulders, as they attended the Greek emperor to the temple, the senate, and the hippodrome. The keys of the palace, the treasury, and the capital were held, says Gibbon, by the firm and faithful hands of the Varangians, and they preserved, till the last age of the empire, the inheritance of spotless loyalty, and the use of the Danish or English tongue.—In oriental history an important part was played by the Turkish guards of the caliphs, who were first introduced at the court of Bagdad by the caliph Motassem. Their numbers soon swelled to 50,000, and their ambitious generals made use of them at first to decide the succession to the caliphate, and at length to depose and create at their pleasure the commanders of the faithful. In the course of 4 years they murdered 8 caliphs,

and finally made themselves substantially masters of the empire, which was ruled by their leaders under the title of *emir al emra*, or captain of the captains. The Turkish guards of the sultans of Egypt imitated the career of their brethren at Bagdad, and elevated their officers to the rank of sultan, from which their effeminate successors were in turn deposed by another corps of guards of different race, the famous Mamelukes. In modern oriental history the most celebrated guards were the janizaries of the Turkish sultan. These were instituted in the 14th century by Amurath I., who selected thousands of the handsomest and strongest of the Christian boys of the provinces he had wrested from the Greeks, and trained them in the Mohammedan religion and the use of arms. In course of time, these troops, long the bulwark of the Ottoman throne, became mutinous and turbulent. They deposed and murdered several sultans. After a long and dubious struggle between them and Sultan Mahmood, they were finally broken up in 1826. An imperial proclamation of June 17, in that year, abolished for ever the janizaries, and laid a curse upon their name.—The French kings at a very early period surrounded themselves with guards in imitation of the Roman emperors. The guard of Clovis (486–511) consisted of a small body of cavalry. In 587 his grandson, Gontran, enlarged the royal guard, and added to it a body of infantry. Charlemagne augmented it still further, and organized it in a manner that remained unchanged till the reign of Philip I., when, in 1060, some slight changes were made. In 1192 the guard of Philip Augustus amounted to 200 men, and fought at the head of the cavalry in the battle of Bovines. In 1888 Charles VI. had a guard of 400 men, which distinguished itself at the battle of Rocebeque. About the middle of the 15th century Charles VII. selected for his body guard a company of Scottish archers, who had displayed their valor and fidelity in the war in which the English were expelled from France. In 1474 and 1475 Louis XI. added two French companies. Francis I., in the following century, formed a third French company, and in the course of his reign the first company, though it continued to be called the Scottish archers, began to be composed entirely of Frenchmen. The total number of the body guard at this period was 430 men. Louis XIV. raised it to 1,600, but toward the close of his reign it was reduced to 1,440 men. At different periods this corps was successively armed with bows and arrows, with arquebuses, carabines, muskets, and pistols, with javelins, swords, and sabres. For the most part, its members, privates as well as officers, were of gentle birth. Its history is intimately connected with that of the French monarchy. As the captain of the guard was always in attendance upon the king from the time the monarch quitted his bedchamber in the morning until he retired to rest at night, this constant access to the royal presence made the post one of great social

and political importance, and it was therefore eagerly sought by the most illustrious nobles. As early as 1443, according to some historians, a Swiss company formed a portion of the body guard of the French kings. Under Louis XI. they began to be called the *cent Suisses* (the 100 Swiss), a title which they retained for centuries, though their numbers in time greatly exceeded 100. In Aug. 1792, when the Swiss guards fell almost to a man in heroic defence of their royal master Louis XVI., they constituted a regiment upward of 1,000 strong. Suppressed by the revolution, the royal body guard reappeared in 1814, when it was formed of 6 companies, numbering altogether 1,722 men. By a decree of Dec. 30, 1818, it was reorganized in 4 brigades, and comprised 1,400 men. They were finally disbanded shortly after the revolution of July, 1830. Beside their body guard, the French kings maintained a select body of troops called the royal guard, which under Louis XI. amounted to 4,000 men. Under Charles VIII. this corps was still further enlarged, and by Francis I. was augmented to the number of 10,000 men. The guards bore a prominent part in the 16th century in the battles of Ravenna and Marignano. Under Louis XIV. this corps, which still numbered 10,000, was magnificently armed and uniformed, and brought to a high state of discipline. It distinguished itself greatly on the battle field, particularly at Malplaquet, Sept. 11, 1709. In 1775 the royal guard was reduced by the disbanding of several companies, and when the revolution began in 1789 it numbered in all its branches, including the Swiss and the body guard, only 8,155 men. It was wholly disbanded during the revolution, and was restored by Louis XVIII. by a decree dated Sept. 1, 1815. In 1825 it comprised about 25,000 men, and was recruited from the picked soldiers of the army. It was disbanded in Aug. 1830, together with the king's body guard, and was not reestablished under Louis Philippe, though in 1832 Marshal Soult created a kind of substitute for it out of some companies of grenadiers. The French directory, in Nov. 1799, created a body of guards composed of infantry, artillery, and cavalry, to the number of 2,089 men. Napoleon, while first consul, formed from this the consular guard, which he raised to 5,224 foot soldiers and 2,070 cavalry. After his election as emperor the name was changed to imperial guard, and the number raised in 1804 to 9,795 men, in 1805 to 12,175, in 1806 to 15,470, and in 1807 a regiment of Polish lancers was added. In 1809 the corps then existing took the title of the old guard, and the young guard was formed, consisting of 8 regiments and 2 battalions of various arms. In 1810 the entire guard consisted of 32,330 men, in 1811 of 51,906, in 1812 of 55,946, in 1818 of 81,006, and at its highest pitch of organization in 1814 it comprised 102,706 men. After Napoleon's return from Elba the guard was reorganized to the number of 26,850 men. In the last 8 years of Napoleon's reign the guard was

recruited from lists of candidates offered by each regiment of the line, and the conditions of admission to those lists required the candidate to have preserved an unblemished moral and military reputation, to have served not less than 5 years in the army, and in at least two campaigns. The guard enjoyed high privileges. It took precedence of all other troops, and had about one-third more pay and a handsomer uniform than the mass of the army. The privates of the guard ranked as corporals of the line, the corporals as sergeants, and so through all the grades of officers to the majors, who had the rank of colonels. In all the campaigns of Napoleon, from 1800 to 1815, the guard bore a distinguished part. It was particularly conspicuous in the defence of France against the allies in 1814, and ended its career gloriously amid the final disaster of Waterloo. By a decree of May 1, 1864, the emperor Napoleon III. reestablished the imperial guard, with nearly the same privileges and the same uniform as the guard of the first empire. It comprises 17 regiments of infantry, cavalry, and artillery, a squadron of workmen, a squadron of mounted gendarmes, and a division of the corps of engineers. A previous decree, March 24, 1854, created a special body guard of picked men for the service of the emperor and the imperial palace, called the *cent gardes* (100 guards), whose number however in 1859 amounted to 221.—In Russia, the czar Ivan Vasilievitch the Cruel, in the latter half of the 16th century, formed a body of guards termed in Russian *Strieltsi* (archers), whose number rose sometimes to 40,000. The strelitzes became formidable to the government, like the Roman praetorians and the Turkish janizaries, and were finally suppressed in 1697 by Peter the Great, who put thousands of them to death and banished the rest to Astrakhan, where in consequence of their turbulence they were entirely destroyed in 1705. An imperial guard was formed by succeeding czars, which in 1785 amounted to 10,000 men, and at the present time (1859) consists of 41,337 men.—The Austrian emperor has a body guard of nobles, which in 1859 consisted of 600 men; but there is not in the Austrian army a select corps corresponding to the imperial guards of France and Russia. In the Prussian service the guards form 2 divisions, and constitute a large and complete army corps.—In England, the guards is a general name for the household troops of the monarch. The horse guards were originally gentlemen of approved valor selected to guard the king's person. The first troop was raised in 1660. Subsequently the horse guards were termed the life guards. In 1698 a troop of horse grenadier guards was instituted, and the command given to Lieut. Gen. Cholmondeley. A 2d troop was raised in 1702, and the command given to Lord Forbes. The foot guards were raised in 1660, and the command of the first regiment given to Lord Wentworth, of the 2d to Gen. Monk, and of the 8d to the earl of Linlithgow. The 2d regiment of the foot guards

is called the Coldstream guards, because it was first embodied in the town of Coldstream in the south of Scotland. The yeomen of the guard were created by Henry VII. in 1486; their first captain was the earl of Oxford. Their original number was 50; at present they consist of 100 with 70 supernumeraries. In 1859 there were 2 regiments of life guards, 1 of horse guards, 7 of dragoon guards, 1 of grenadier guards, and 2 of foot guards, numbering altogether 12,889 men.

**GUARDS, NATIONAL**, a body of militia or of citizen soldiery, first instituted in France in 1789. Early in that year the court, to overawe the national assembly and the people of Paris, had concentrated at the gates of the capital an army of 80,000 regular troops, commanded by the marshal duke de Broglie. To counteract this demonstration, the citizens demanded arms, and on July 13 a municipal council decreed the formation of a militia of 60 battalions numbering 48,000 men. It was raised with great rapidity, and white, the color of the royal standard, was united with the blue and red colors of the city of Paris to form the color of this revolutionary force, afterward so famous as the tricolor. On July 14 the king acquiesced in the formation of the civic guard, as it was at first called, and that same day the Bastille was stormed by the people. The next day Lafayette was appointed its commander. The other cities of France promptly followed the example of Paris, and when the institution became general throughout the country it took the name of national guard. In Dec. 1790, and in Oct. 1791, laws were passed regulating its organization, and submitting the whole body to a definite code of regulations, and giving it the same discipline and the same uniform in all parts of France. The guard was to consist of one out of every 20 citizens, to be raised by voluntary enlistment, and to be paid, armed, and uniformed by the nation. The effect of the formation of this body was soon felt throughout France. "Though timid and vacillating at first," says Alison, "it became at last the great means of rescuing the country from the iron yoke of the populace. Composed of citizens of property and respectability, it generally, though not always, inclined to the side of order, and ultimately was found combating that very despotism which arose out of the insurrection it was originally formed to support." It was chiefly the men of the middle classes who enrolled themselves in its battalions, and in a few months after its formation it numbered in the provinces 800,000 men, and in Paris 80,000, who could be increased in a few hours by beat of drum to 60,000, all in a high state of equipment and discipline. By thus diffusing a military spirit and a military organization through France, the national guard contributed largely to the ease with which the republican armies were raised to act against the foreign enemies of France. In 1795 the national guard of Paris, to the number of 30,000, rose in arms against the convention, Oct. 5, and attacked the Tuilleries,

but were repulsed and defeated by 6,000 regular troops commanded by Napoleon Bonaparte. The next day the organization of the national guard was changed, and it was placed under the authority of the commander-in-chief of the regular army, thus depriving it of its character as a civic militia. From this time forward the national guard was of little consequence till 1809, when Fouché, in the absence of the emperor, reorganized it in the north of France to repel the English invaders. It acted with promptitude and success, but Napoleon did not approve of putting arms into the hands of the people, and it was not till after his reverses in 1814, and till France was invaded by the allies, that he would consent to the reorganization of the national guard of Paris, on whom in the last emergency he relied for the defence of the capital. The national guard was disposed to act vigorously at this crisis, but was prevented by want of arms and by the defection of most of the great civil and military officers of the empire. The Bourbons after their restoration made the national guard dependent on the royal government. Monsieur, the king's brother, was appointed its commander-in-chief, and the guard was deprived of the right of electing its officers, who were now all appointed. On April 29, 1827, while the king, Charles X., was reviewing the national guard of Paris, many petitions were handed to him by the members, demanding the dismissal of his ministers, who had become obnoxious to the people. A portion of the guard also uttered cries of "Down with the ministry!" In consequence the guard was disbanded the next day. During the revolution of July, 1830, the national guard was revived at Paris, and on July 30 Lafayette, who 40 years before had commanded the first national guard, was again made commander-in-chief. Throughout the difficulties which beset the early years of the reign of Louis Philippe the guard rendered important services to the cause of order and of liberty. After the revolution of 1848, in which, and in the subsequent insurrections of that year, it bore a conspicuous part, the national guard was largely increased, and by a law of June 26, 1851, it was organized throughout France and made to include all citizens above the age of 20, except regular soldiers, and persons employed in the service of the government. By a decree of Feb. 25, 1848, the provisional government directed 24 battalions of national guards to be especially raised in Paris, and called *la garde mobile*. It was formed mostly of idle youths and workmen out of employment, and received high pay. Its uniform differed slightly from that of the ordinary national guard, and it was equipped like the soldiery of the line. In the insurrection of June, 1848, it distinguished itself by the furious intrepidity with which it fought against the red republicans, and for a time was very popular with the respectable classes. But it afterward grew turbulent and dangerous, and was suppressed in 1849. After the coup d'état of Dec. 21, 1851, the national guard

was dissolved, and reorganized by a decree dated Jan. 11, 1853, on a new and much restricted plan, which reduced it to the condition of a mere civic guard for the repression of tumults and disorders. Organizations similar to the national guard of France have been formed in other countries, for which see MILITIA.

GUARINI, GIOVANNI BATTISTA, an Italian poet, born in Ferrara in 1537, died in Venice in 1612. Having become at an early age a professor at Ferrara, and for some time lectured on the ethics of Aristotle, he entered the service of Alfonso II. of Ferrara, was knighted by him, and intrusted with diplomatic missions to the republic of Venice, the duke of Savoy, the pope, the emperor, and the diet of Poland. A second mission to Poland, where he had promoted the election of Henry of Valois, and now failed in promoting that of his own patron, cost him a part of his fortune, and the favor of the duke. He was dismissed, but restored in 1585, serving as secretary of state, which office, however, he resigned after 2 years. He again took service in 1592 at the court of Ferdinand I., grand duke of Tuscany, which he soon left, complaining of a grave insult, and repaired to the court of Urbino. His native city afterward chose him as ambassador to Rome, to congratulate Paul V. on his accession (1605). But litigations which arose in his own family after the death of his wife, and still more the violent death of his daughter at the hand of her husband, embittered his old age. His best productions are his comedy *L'idropica*, his dialogue *Segretario*, his *Rime* and *Lettere*, but particularly the pastoral drama *Il pastor fido*, first represented at Turin on the occasion of the marriage of the duke Charles Emanuel with Catharine of Austria in 1585; it passed through 40 editions in the lifetime of the poet, and has since been translated into all the languages of Europe. An incomplete edition of his works appeared at Ferrara in 1737 (4 vols. 4to.); his *Trattato della politica libertà* was first printed at Venice in 1818, with his life by Ruggieri.

GUATEMALA, a republic, the first in population and the second in extent among the 5 political divisions of Central America, lying between lat. 14° and 18° N., and long. 89° and 93° W., and bounded N. by the Mexican provinces of Tabasco, Chiapas, and Yucatan, E. by the British establishment of Balize and the bay of Honduras, S. by the republics of Honduras and San Salvador, and W. by the Pacific ocean; area, exclusive of Balize, estimated at 38,000 sq. m.; pop. in 1851, 971,450. Politically it is divided into 16 departments, Guatemala, Sacatepequez, Amatitlan, Escuintla, Vera Paz, Santa Rosa, Jutiapa, Chiquimula, Isabal, Chimaltenango, Quetzaltenango, Sacatepequez, Totonicapam, Solola, San Marcos, and Huehuetenango. The E. coast lies wholly on the bay of Honduras, which indents it deeply, but irregularly, forming at its W. end an inner basin called the bay of Amatitlan, into which opens the gulf of Dulce. Santo Tomas is the principal port on this coast, but it has little

trade. The Pacific coast trends N. W. and S. E., and is mostly low, and bordered by a strip of low land 20 or 30 m. wide, back of which rise the table-lands and mountains. Some parts, however, are bold and rocky, and are faced by dangerous reefs.—Among the lakes of Guatemala, those of Amatitlan, Atitlan, Dulce or Isabal, and Peten or Itza, are most remarkable and interesting. The first 3 have been treated under their own titles. The lake of Itza, in the unexplored department of Vera Paz, is very irregular in form, having a total length of from 40 to 50 m., and an average width of 8 m. Although it receives the waters of a number of streams, it has no outlet, whence the Indians sometimes call it Nohuken, or Drink-much. During the dry season its level is considerably lowered by the evaporation from its surface, while in the rainy seasons it often threatens to overflow the low grounds on its banks. Surrounded by a plain country, or rather a great terrestrial basin, it is exposed to sudden storms, under the influence of which, it is said, its waves often roll with the majesty of those of the ocean. It has a number of islands, on the largest of which, and occupying the site of the ancient stronghold of the warlike Itzacs, who resisted the assaults of the Spaniards down to 1698, is the modern town of Flores. On the other islands of the lake and around its shores are numerous considerable monuments of aboriginal architecture, corresponding generally with those of Yucatan. The principal rivers of Guatemala flow northward into the gulf of Mexico, or eastward into the bay of Honduras. Those falling into the Pacific are small and incapable of being navigated. The largest is the Usumasinta, which under the names of La Pasion, Lacandon, &c., drains nearly half of the republic, and pours its waters through numerous mouths into the Laguna de Terminos and bay of Campeachy. The greater part of its course of 400 m. is through a wilderness occupied by the Manches, Lacandones, and other unconquered Indian tribes. At present, therefore, except near the sea, it is unavailable for navigation and commerce. The Rio Motagua, sometimes called Gualan, is next in size to the Usumasinta, with which its sources interlock. It rises within 90 m. of the Pacific, and flows in a very direct course a little N. of E. into the bay of Honduras, near the port of Santo Tomas. Its total length is about 350 m. Shut in by parallel ranges of mountains, it has a very narrow valley, contracting in places into a mere gorge, and receives but few and comparatively small tributaries. It is navigable for *bongos* or native barges for 150, and for canoes 250 m. above its mouth. It enters the ocean by a number of channels obstructed by dangerous bars, and for this and other reasons can never become of much value for commerce. On the right bank of the Motagua, 80 m. from the sea, are found the remarkable ruins of Quirigua. The Rio Polochoc, to the northward of the Motagua, is a large and beautiful stream. It takes its rise in the high plateau

of Salama, traverses the S. districts of Vera Paz, receiving the large tributary of Rio Cajabán, and falls into the lake of Isabal. It has a total length of 150 m., and may be ascended by canoes for 80 m. It was on the banks of this river that an English company in 1839 attempted, unsuccessfully, to found a colony. The largest stream falling into the Pacific is the Rio Michatoyat, which rises in the lake of Amatitlán. It has a rapid course of 70 m., for the most part through an unbroken forest. It has several falls, one of which, near the village of San Pedro Martyr, is over 200 feet in height, and in wildness and grandeur comparable with the finest cataracts of the continent.—The tableland which forms most of the surface of the republic has an elevation toward the S. border of about 5,000 feet above the sea, rising still higher to the northward, and reaching its greatest altitude about lat.  $15^{\circ} 30'$ , long.  $91^{\circ} 45'$ . Thence it sinks gradually toward the N. E. coast, and is broken by several deep valleys. The descent toward the Pacific side is so steep that from the ocean it presents the appearance of a range of mountains. There are no ridges, however, which rise above the character of hills a few hundred feet high, except those formed between the deep valleys which cut into the plateau on the E. border. There are several isolated volcanoes on the Pacific side, all of which are on a line with those of San Salvador and Nicaragua. They are of vast size, and, rising generally from a lower base than those of Mexico and South America, leave an impression of greater altitude and more imposing grandeur. The loftiest of these are the volcanoes of Agua and of Fuego, which dominate the old capital of Guatemala; the first is 14,507 feet in total elevation, and may be ascended; the second rises to the height of 13,980 feet, but no mortal foot has yet reached its top, whence proceeds constantly a volume of smoke, varied by frequent eruptions of fire and ashes. The volcano of Atitlán, near the lake of the same name, has an altitude of 11,510 feet, and there are numerous other extinct cones of eruption varying from 8,000 to 8,000 feet in height.—The climate of Guatemala varies greatly with its varying elevations, from the usual tropical heats of the seaboard, through the intermediate spring-like temperature of the interior plateaus, to the cold and often wintry climate of the mountains. The plateau on which the capital is built is elevated 4,200 feet above the sea. Here, for the year 1857, the average maximum of the thermometer was  $88.7^{\circ}$ , the average minimum  $88.9^{\circ}$ , and the average mean  $65^{\circ}$  F. The barometrical average mean for the same period was 25.23 inches, the range being very slight, indicating an equable state of the atmosphere. The amount of rain which fell during the same year was 54.5 inches, being less than half the average amount which falls under the tropics, calculated by Prof. Johnson in his tables at 113 inches. On both coasts the temperature is of course higher, but the data do not exist

for a comparison with that of the interior. At Santo Tomas, for the months of January, February, and March, 1842, it averaged  $84^{\circ}$  F. at noon. In the departments of Quetzaltenango, Totonicapam, &c., denominated Los Altos, frost and snow are not uncommon during certain months of the year; and here wheat, peaches, apples, and other products of higher latitudes are grown in abundance. The products of the country at large are therefore as various as its soil and climate. Rice, cotton, sugar cane, tobacco, indigo, &c., flourish luxuriantly on the low grounds, while the intermediate altitudes are devoted to grazing, and the cultivation of coffee and cochineal. The latter is the great staple of the republic, and its production has risen from 100 seroons of 150 lbs. each in 1827, to 700 seroons in 1830, and 9,794 in 1849. It is however almost exclusively produced in 2 or 3 districts near the capital, and the crop moreover depends upon so many contingencies that it is exceedingly precarious. Its variations will appear from the following statement: 1849, 1,469,100 lbs.; 1851, 1,231,610; 1852, 567,000; 1853, 312,700; 1854, 1,757,800; 1855, 1,204,510. The staple of the mountain districts of Los Altos is wool, which is manufactured into a coarse variety of native cloth called *jerya*, for domestic consumption. The wool crop for 1857 was about 1,500,000 lbs., valued at 7 cents a pound. As already said, wheat of a superior quality is raised here, but, in consequence of the absence of roads, does not enter largely into commerce. Its value in Quetzaltenango is about 17 cents a bushel, while in the city of Guatemala, less than 100 m. distant, it is upward of \$1.—In respect of minerals, Guatemala does not appear to be rich; the only mines which are worked to advantage being on the frontiers of Honduras, and belonging to the great mineral system of that republic. They comprise gold, silver, copper, and lead. Jasper, marble, and sulphur are found, and salt is manufactured on the Pacific coast. The animal kingdom is very rich and varied. Beside the animals common to the American continent, there are the zorillo, a species of small fox, the quetzal, a bird of magnificent plumage, the manatee or sea cow, the alligator, the green turtle, many excellent species of fish, and the formidable and noxious warrior ant, which are twice the size of common ants, and move in regular array like an army.—Of the inhabitants of Guatemala, about two-thirds are Indians, and the rest *ladinos* and whites—the latter being insignificant in number. There are but few negroes. The whites, with the exception of a few merchants or shop-keepers in the towns, are mostly *hacenderos*, or proprietors of estates of cochineal and other staples; the *ladinos*, or mixed whites and Indians, are the mechanics and petty traders; the Indians, here as elsewhere in Central America, constitute the bulk of the laboring population. Some of the largest towns in the remote districts are made up of Indians exclusively, speaking their native tongues, and conforming only nominally

to the laws, religion, and general regulations of the state. There are furthermore in the northern districts, around the head waters of the Rio Usamasinta, a number of indomitable Indian tribes, which, although included in the territorial limits of the republic, are practically independent. The relations that exist between them and the government may be inferred from the terms of a treaty made with one of them, the Manches, in 1837, which provided that they should be regarded as under the protection of the republic, but not to be subject to its laws until at the end of 7 years, and that even then there should be no change attempted in their religion, nor should there be any interference with their practice of polygamy. In fact, the distinctions of race are so strongly marked, that in many of the towns and districts, within short distances of the capital, there are two classes of magistrates, one for the ladinos and another for the unmixed Indians. The latter are always of pure aboriginal blood, and are distinguished for their rigor and cruelty; so much so indeed, that the Indians themselves often appeal to the ladino magistrates.—Until recently the commerce of Guatemala exceeded that of any other Central American state; but with the establishment of a coast-wise line of steamers on the Pacific, San Salvador, with less than half its population, has taken the lead. This result is due to several causes, chiefly the want of roads and lack of good ports in Guatemala. Its only good port on the Atlantic is Santo Tomas; but, owing to the physical conformation of the country, it is almost inaccessible, and is moreover remote from the centres of population, which are 800 m. distant, near the Pacific. Isabal, the only remaining port on the Atlantic, is not only deadly in climate, but inaccessible to any except the smallest vessels. Nevertheless, it has been through this port that the commerce of the country has hitherto been carried on. But the road to it is not only long and difficult, but much infested by robbers. Car-goes of value have to be sent under escort, and are often 8 weeks or a month in reaching the port from the capital. Lately, however, this route has been in great part abandoned for the facilities offered to communication with the United States and Europe, *via* Panama, on the Pacific side. But on this coast there are absolutely no good ports. The so called port of San José, the only one in use, is an unprotected roadstead, where vessels are obliged to lie at a long distance from shore, with which communication can only be had by means of lighters, and frequently, for weeks together, not at all. The commerce of the republic for the past 8 years is expressed in the following table:

Years.	Imports.	Exports.
1851.....	\$1,551,894	\$1,404,000
1852.....	975,948	868,550
1853.....	573,681	599,047
1854.....	824,481	2,083,900
1855.....	1,905,910	1,922,591
1856.....	1,065,516	1,708,968
1857.....	1,184,517	1,615,888
1858.....	1,222,570	1,924,500

Of the total imports during this period, about  $\frac{1}{3}$  was from the United States and  $\frac{2}{3}$  from Great Britain, France furnishing the next largest amount. The customs dues are levied specifically, and are said to be equal to about 80 or 85 per cent. *ad valorem*. A considerable part of this, however, is covered by the acceptance of a certain proportion of the largely depreciated government paper in payment of duties. Cochineal pays an export duty of 62½ cents on each seroon to the church. Every package of goods exported pays 12½ cents duty on the Atlantic, and 25 cents on the Pacific coast. The exportation of the live cochineal insect, as well as of the seed of the native indigo plant, is prohibited. The revenues from customs for 5 years were as follows: 1851, \$372,643; 1852, \$328,246; 1853, \$203,110; 1854, \$182,108; 1855, \$287,558; 1856, \$284,169; 1857, \$303,966; 1858, \$327,872. The tonnage entering the ports of the republic for the same years was as follows: 1851, 8,409 tons; 1852, 8,829; 1853, 4,629; 1854, 8,592; 1855, 12,600; 1856, 14,495; 1857, 18,749; 1858, 20,043. The revenues of the government for 1856 from all sources were \$1,040,144, and the expenditures for the same year were \$1,024,858. For 1857, the revenues were \$748,870; expenditures, \$776,016, of which \$482,086 was on account of the army—a considerable excess over the previous year, due to the cost of the contingents sent to Nicaragua against Walker. The foreign debt of the republic is \$500,000, at 5 per cent., for the interest on which, and as a sinking fund for its liquidation, the proceeds of the custom house at Isabal are pledged. The floating or interior debt is about \$700,000. A number of annual fairs are held at different towns of the republic, at which a large part of its domestic traffic is effected. The principal one is that of Esquipulas, held on Jan. 15. It calls together many thousands of people, numbers of whom come from Mexico and South America, attracted by the fame of our Lord of Esquipulas (*Nuestro Señor de Esquipulas*), who has here a shrine of great sanctity and renown. According to Mr. Stephens, 80,000 pilgrims have been known to be gathered here at a single time. A large quantity of merchandise is sold during this fair, and importations from England are frequently made by way of Isabal, to meet the demand which it occasions.—The government of Guatemala, although nominally republican, is in point of fact an oligarchy, in which the real power is exercised by a few leading families, the remnants of the old vice-regal court, and the dignitaries of the church. In the political nomenclature of Central America, Guatemala is under "servile" or reactionary influences, as opposed to "liberal" and progressive principles. The nominal head of the government is Rafael Carrera, an uneducated mestizo, who first gained political importance as the leader of the Indians, in the bloody war of castes which devastated the country between the years 1837 and 1840. He bears the title of captain-general, and by

certain acts, consummated in 1854, was made *presidente vitalicio*, or president for life, with power to name his successor. Under his rule the Jesuits, expelled from the other Spanish American states, have been invited to Guatemala, where they have founded a college supported by government, and obtained the general control of education; the convents, abolished soon after the independence of the country, have been re-established; a censorship of the press has been instituted; and the archbishop has been invested with power to prohibit the introduction and sale of such books as do not meet his approval. The power of the president is absolute. There is a legislative assembly, but its duties are scarcely more than nominal. It is composed of 44 deputies apportioned among the departments, with the addition of two members each from the chapter of the cathedral, the university, the high court of justice, the economical society, and the tribunal of commerce. The Roman Catholic religion is established by law, to the exclusion of all other forms of worship. The university of San Carlos, founded in 1550, is still in existence, and has a considerable reputation throughout Central America; but the course of instruction is rather religious than scientific, and hardly comes up, in the latter respect, to the ordinary high schools of the United States. Among the people at large the profoundest ignorance prevails, and the majority of the population can neither read nor write. In respect of morals, the country throughout presents a corresponding dreary and unpromising aspect. Even in the more civilized departments, nearest the capital, the proportion of illegitimate births is quite one third of the total number.—Guatemala is second neither to Mexico nor Peru in its historical interest and associations. Here Alvarado found nations, no one of which was as widely diffused nor as powerful as the Aztecs or the Incas, but all of them were further advanced in architecture and the arts, and had almost, if not actually, attained a written language. The Quiches, Zutngils, and Kachiquels, the 3 great affiliated aboriginal nations of Guatemala, may be taken as the types and best exponents of that race which sent its colonies, under the name of Mayas, into Yucatan, and which, under the name of Tlhuatecas or Toltecs, carried the elements of civilization into Mexico long anterior to the foundation of the Aztec empire. The evidences of their proficiency in the arts remain to us in the ruins of Palenque, Ocosingo, Uxatlan, and the numerous other Palmyras of the forest which abound throughout its territories and those of its neighboring states and provinces. Guatemala became known to the Spaniards through Pedro de Alvarado, who conquered it in 1524, and governed it until his death, which took place in 1541, at first as the lieutenant of Cortes, and afterward under a commission from the Spanish crown. In 1542 a chancery and royal audiencia were established at Guatemala, with authority over both this

country and Honduras. The captain-general received his appointment from the home government, and was independent of all other authority in Spanish America. In 1821 Guatemala declared its independence. Soon afterward the people annexed their country to the Mexican empire of Iturbide, but this measure involved them in a war with Honduras, San Salvador, and Nicaragua. A Mexican force marched to their assistance, and compelled the government of San Salvador to sign a treaty of union with Guatemala, but meanwhile Iturbide was overthrown, and a federation of the 5 states of Guatemala, San Salvador, Honduras, Nicaragua, and Costa Rica, under the name of the United States of Central America, was proclaimed July 1, 1823. A constitution for the new republic was completed by the national assembly in Nov. 1824. After 15 years of civil feud the union declared its own dissolution in 1839. The districts of Soconusco and Chiapas, which formed part of Guatemala, had attached themselves to Mexico even before the ratification of the constitution of 1824, and in 1833 Mexico proceeded to a formal occupation of the territory. The question which was then raised was finally settled in 1854, by means of a convention, wherein Guatemala surrendered all her claims over Soconusco and Chiapas for the sum of \$420,000. It is said that lately (1859) Carrera, taking advantage of the disordered and helpless condition of Mexico, has promoted revolutionary movements in Chiapas, with the ultimate purpose of annexing that province to Guatemala; but the truth of the case is difficult to be reached. Another conflict also existed with Great Britain, dating from the independence, in regard to sovereignty over the territory of Balize or British Honduras—the origin and nature of which is fully set forth in another place. (See BALIZE.) This dispute has lately been settled by a convention between the two governments, which now (Oct. 1859) only awaits the ratification of the British crown, to become definite and final. By its provisions Guatemala concedes to Great Britain the entire coast of Vera Paz, from the river Sarstoon northward to the boundaries of Yucatan, a coast line of about 160 m., and an extent of territory inland to the meridian of a point on the Siboon river called Garbutt's falls, being a distance of about 80 m.—the whole concession amounting to about 12,000 sq. m. By this convention the Atlantic seaboard of Guatemala is reduced to the narrow line of coast, not exceeding 80 m. in length, between the mouths of the rivers Sarstoon and Motagua.

GUATEMALA, NUKVA, a city, and the capital of the republic of Guatemala, built on a high, level, open plain, 4,873 feet above the sea, about 90 m. from the Pacific ocean, in lat. 14° 38' N., long. 90° 30' W.; pop., including suburbs, estimated at 45,000, and rapidly increasing. It was founded in 1776, after the partial destruction of the old capital of the country, now called Antigua or Old Guatemala, by an

earthquake in 1778. Beyond its fine climate, and the beautiful prospect which it commands, it possesses few advantages. The neighboring country, although not absolutely sterile, is deficient in water, which, for the use of the city, has to be brought a distance of 15 m., through an aqueduct supported on a great number of arches. It is also disadvantageously situated for commerce, both as respects the two oceans and the principal centres of population of the republic. It is nevertheless far the most important city of Central America, and the centre of much wealth. It is regularly laid out in a quadrilateral form, with its sides conforming to the cardinal points; the streets, 40 feet wide, cross each other at right angles. The great *plaza*, or public square, in the centre of the town, is flanked on one side by the municipal and government edifices, opposite to which is the cathedral. The city can boast of no public building of architectural pretensions, except the theatre, erected in 1858, which is of large size, and of pure Greek architecture. There is a public water tank in the suburbs, surrounded by a double row of arches. Among the other buildings may be enumerated the government house and offices, the city hall, the mint, the university of San Carlos, the Tridentine college, the hospital of San Juan de Dios, and a considerable number of churches. There is a circus for bull fights and other open air performances, an abattoir for slaughtering cattle, and a cemetery. A fort mounting a few pieces of cannon, called *el Castillo*, has been erected on a small eminence near by, but is itself commanded by other eminences. The private houses are low and inelegant, but their courts, surrounded by open corridors, planted with trees and flowers, and decorated with fountains, are often of great beauty. The mildness of the climate makes contrivances for the diffusion of artificial heat unnecessary, and fireplaces and chimneys are unknown.—GUATEMALA (ANTIGUA), the old capital of the audiencia or kingdom of Guatemala, 80 m. W. of the above, in the centre of the plain or valley lying between the volcanoes of Agua and Fuego, having, according to the Spanish saying, "paradise on one hand and hell on the other;" pop. about 20,000. The beauty of its position, the richness of the adjacent country, and the grandeur of the surrounding scenery, have elicited the highest expressions of admiration from travellers. Previous to 1778 it was a large and magnificent city, second only to Mexico in all Spanish America. It had upward of 60,000 inhabitants, 100 churches, and 20 monasteries. Most of these edifices, as well as the vice-regal palaces, are in ruins, but from the adaptability of the surrounding district for the cultivation of cochineal, the city is regaining something of its former activity and importance. In the centre of the town is a grand square, and from it the traveller enjoys a prospect, the beauty of which it is impossible to convey in words. In its centre is a noble stone fountain, and facing it are the old palace, bear-

ing on its front the armorial bearings granted by Charles V. to the "loyal and noble city," surmounted by the apostle James on horseback, brandishing a sword, and the majestic, but roofless and ruined cathedral, 800 feet long, 120 feet broad, 70 high, and lighted by 50 windows. All these show to this day that the ancient city well deserved the proud title which it bore for centuries of Santiago de los Caballeros, or the city of St. James of Gentlemen. The first site of the city was nearer the volcano of Agua, at a place which is still called *Ciudad Vieja*. This was founded by Alvarado, but abandoned in 1541, in consequence of a great earthquake, accompanied by a deluge of water from the volcano, which occurred on Sept. 17 of that year, while the obsequies of Alvarado were being performed. Upward of 600 of its inhabitants perished, and the survivors abandoned the ruins, and established themselves at what is now La Antigua, which was itself in great part abandoned on account of a similar catastrophe which happened in 1778. The flood of water, which was the proximate cause of the destruction of *Ciudad Vieja*, was doubtless occasioned by the filling up of the extinct crater of the volcano by heavy rains, the water breaking through one of its sides, and rushing down the side of the mountain. The deep ravine formed in its descent is still traceable.

GUATUSOS, an indomitable tribe of Indians, living on the banks and head waters of the Rio Frio, which flows into Lake Nicaragua at its S. extremity. The country of these Indians, who are popularly supposed to have comparatively fair complexions and red hair, has never been penetrated. The attempts made by the Catholic missionaries and the governors of Nicaragua, during the last century, to reach and reduce them, though often renewed, have always been repulsed. A body of men under the command of the fort of San Carlos endeavored to reach them in 1849, but they were driven back with loss. It has been supposed that the Guatusos are the original inhabitants of the secluded and almost inaccessible district which they occupy, reinforced and rendered more jealous of the whites by the people of the various Indian towns destroyed by the Spaniards and pirates of the South sea. There are some reasons for believing that they are of the same Aztec family which occupied the western shores and the islands of Lake Nicaragua, and that they still preserve their original language and habits, little if at all impaired.

GUAXACA. See OAXACA.

GUAYAPE, a river in the republic of Honduras, an affluent of the Patuca, flowing into the bay of Honduras near the port of Truxillo. This river has been celebrated from the earliest period for its rich gold washings, which are worked by the natives in a rude manner to this day. All the streams in the department of Olancho carry gold in their sands, but none have an equal celebrity in this respect with the Guayape.



**GUAYAQUIL**, a W. province of Ecuador, S. A., in the department of Guayas, bounded N. by the provinces of Manabé and León, E. by Chimborazo and Cuenca, S. by Loja and Peru, and W. by the Pacific ocean; area estimated at 14,400 sq. m.; pop. at 55,627. It comprises the 6 cantons of Guayaquil, Daule, Vinces, Babahoyo, Santa Helena, and Machala. The sea coast is very irregular, being broken by many prominent headlands, bordered with islands, and deeply indented toward the S. by the gulf of Guayaquil, which reaches inland to about the centre of the province. This gulf is thickly studded with islands, one of which, called Puna, is of large size. The Jubones, Yaguachi, Guayaquil, Palenque, and Daule, the last of which is called Santa Lucia in the upper part of its course, are the principal rivers. The surface is mountainous, part of the E. boundary being formed by a ridge of the Andes called the Andes of Quito, and the whole province, except about the labyrinth of streams which unite to form the Guayaquil, being crossed in various directions by smaller ranges. The temperature of the low country is hot and moist. Rains are incessant from December to April, and as the sun has its greatest power during this season, the land then swarms with noxious vermin. The staples of agriculture are cacao, cotton, tobacco, and rice, which, with timber, salt, cattle, wax, and ceibo wool, the product of a tufted tree used for stuffing mattresses, are the principal exports. The imports consist of wine, brandy, oil, flour, bacon, hams, cheese, dried fruits, iron, cordage, and European goods.—**GUAYAQUIL**, the capital of the above province and of the district of Guayas, is situated on the W. bank of the river of its own name, just below the mouth of the Daule, 50 m. from the sea and 150 m. S. S. W. from Quito, in lat.  $2^{\circ} 11' 21''$  S., long.  $79^{\circ} 43' W.$ ; pop. estimated at 22,000. It is built almost on a level with the ocean, and has a humid climate, with a mean annual temperature of  $88^{\circ} F.$  It is exceedingly unhealthy, and infested with the troublesome insects and reptiles common to that part of the country. The harbor is excellent, and there are great facilities for ship-building, excellent timber being found within a few rods of the river, where building yards of capacity for ships of the line have been constructed. The city extends for about  $1\frac{1}{2}$  m. along the bank of the stream, just at the neck of a peninsula formed by the river and its estuary on the E. and an inlet of the gulf of Guayaquil, called the Estero Salado, on the W. It consists of an old and a new town, and is intersected by 5 small creeks which are crossed by wooden bridges. The houses are mostly of wood. The principal edifices are the cathedral, 6 other churches, 2 hospitals, and 2 colleges, with faculties of theology, philosophy, and law. There are primary schools connected with these institutions, and also a school of navigation. The streets are dirty, but relieved here and there by public squares. The river water opposite the town is fresh, but is considered unfit for

drinking on account of the poisonous mangroves which cover the banks above here. An indifferent supply of water is floated down in casks from the upper part of the stream. The city is defended by 8 forts. It has suffered severely from fires, and in consequence of a great conflagration in 1764 was almost abandoned, until a royal order was issued to rebuild it in 1770. It is an important entrepot for the trade between Lima and Quito, and exports cacao, cotton, bark, tanned hides, and thread, the first article being the staple.

**GUAYAQUIL**, a river of Ecuador, lying wholly within the province of the same name, and formed by the union of a great number of small streams which rise among the Andes. It enters the Pacific through the gulf of Guayaquil in lat.  $2^{\circ} 27' S.$ , is navigable about 110 m. to Caracol, and in the upper part of its course is known successively as the Caracol and Babahoyo. It is subject to overflow, and is incumbered by a bar 12 m. from its mouth, and by shifting sand banks.

**GUAYMAS**, a town in the Mexican state of Sonora, on the E. shore of the gulf of California, in lat.  $27^{\circ} 55' N.$ , long.  $110^{\circ} 16' W.$ ; pop. about 8,000. It is the only port of entry for Sonora. It possesses an excellent harbor, and is completely sheltered from the sea. The entrance from S. to N. is formed by the island of Pajaros on the E. and by the islands San Vicente and Pitayas and the mainland on the W. There is another entrance called Boca Chica, from the S. E., having the island of Pajaros on the S. and the shore of Cochori on the N. From the principal mouth to the mole is about 4 m., and the bar is about the same extent. Guaymas has a large foreign commerce, as all merchandise destined for the interior, both for Sonora and Chihuahua, passes through its custom house, whence it is transported by pack mules; its annual amount is about \$2,500,000. The mountainous nature of the country prevents the use of wheeled vehicles, except to a limited extent. The town stands on the margin of the bay, occupying a narrow strip of land about a mile in length and scarcely more than a quarter of a mile in width, when the mountains rise and hem it closely in. It is entered from the N. by a narrow avenue, which forms its main street. The houses are built of stone, brick, and adobe, and in the best parts of the town are plastered. The bay abounds in fish of great variety and delicacy; also with shrimps, crabs, lobsters, and oysters. The Yaqui Indians are the chief fishermen as well as laborers. The soil in the vicinity is dry and stony. Maize and beans, as well as all vegetables and fruits, come from the interior, the nearest point being 10 miles distant. Sheep, fowls, and other products are brought from the valley of the Yaqui river. The heat is intense. In the months of June, July, August, and September, the mercury often rises to  $140^{\circ} F.$  in the shade, and is seldom below  $96^{\circ}$ . The average temperature during this period is  $90^{\circ}$  for the 24 hours. During the remainder of the

year the mean average temperature is about 70°, and at all seasons there is a great uniformity in that of day and night. During the summer months, when the wind blows from the desert plains of the north, it is so dry and parched as to be almost unendurable, destroying furniture and every thing else of wood. Scarcely a soul is then seen in the streets, every one remaining quietly within doors, and passing the time with as little exertion as possible. The place was formerly considered healthy; but of late it has suffered terribly from epidemics, one following the other until the town had lost nearly one-third of its population. Cholera and bilious fevers have been the chief epidemics.

GUDGEON, a piece of metal inserted in each end of a revolving shaft, to serve as a pivot. It consists of 4 wings or blades, which are let into the wood, and the pin which projects from the centre. Gudgeons are commonly made of cast iron, and for the sake of reducing the friction the pins are of the smallest size consistent with the necessary strength. The cube root of the number of hundred weights to be supported is nearly equal, it is calculated, to the diameter in inches of the gudgeons required. But if made of wrought iron of average quality, instead of cast, it is stated that the diameter may be reduced in the proportion of  $\frac{1}{4}$ . The bearings for gudgeons, or, as sometimes called, for journals, these being the parts of a shaft between the points where the power and resistance are applied, are boxes made of brass or of brass lined with a soft alloy, described in the article BABBITT'S METAL. The use of iron boxes has increased of late years; and they answer very well, if kept oiled. But it is found that hard wood wears better than metal. Such was the experience in the British screw steamer Himalaya, on replacing the old brass bearings with others of lignum vitæ. The shaft has a bearing surface of 4 feet in length with a diameter of 18 inches, and over this surface is sheathed with brass. The box upon which it bears is a cast iron pipe, passing through the stern. This was lined with lignum vitæ, inserted in strips, each one 3 inches wide,  $\frac{1}{4}$  of an inch thick, and extending the whole length of the bearing. They were firmly secured in their places, and their surfaces were scored to allow water to circulate freely over them. After the ship had run about 80,000 miles, and the engines had made about 8,000,000 revolutions, the total wear was found not to exceed  $\frac{1}{4}$  of an inch. In such situations, where the bearings can be kept constantly wet, as for water wheels, there is no better material than hard wood.

GUDGEON, a cyprinoid fish, of the genus *gobio* (Cuv.), found in the fresh water streams and lakes of central and temperate Europe. It is characterized by a lengthened, rounded body, with short dorsal and anal fins without serrated rays; by a labial barbel at each corner of the mouth; by pharyngeal teeth, conical, slightly curved at the tip, and in two rows; and by a wide, flattened head, with an obtuse snout, and

the lower jaw the shorter; the swimming bladder is large and double. The common gudgeon (*G. fluviatilis*, Cuv.) is 7 or 8 inches long, of a greenish brown color above and on the sides, white below, the pectorals, ventrals, and anal grayish white tinged with brown, and the dorsal and caudal pale brown with darker spots. It occurs in shoals in the gravelly waters of England, France, central Europe, Russia, southern Sweden, the Swiss lakes, &c., and is rare in Italy and southern Europe. The food consists of worms, aquatic insects and larvæ, small mollusks, ova, and fry; the eggs are laid between April and August, and the young grow to a length of about 4 inches the first year. It is much esteemed as food for its delicate flavor, and affords good sport to the angler, as it is a bold though capricious biter; it will bite at all times of day, but best in the morning and evening, and in cloudy weather; the line must be very fine, and the hook kept within an inch of the bottom; the best bait is the common red dunghill worm. A favorite resort is on the Thames, near Windsor, where great numbers are taken from boats; the ground is occasionally well stirred with a rake, the discoloration of the water thus produced bringing the gudgeons in shoals; they are very tenacious of life. Five other species are described in Europe and Asia, and one from the Niagara river (*G. cataractæ*, Val.), about 5 inches long; the color of this above is gray, plumbeous on the sides, silvery white below, and the fins gray.

GUDIN, JEAN ANTOINE THÉODORE, a French painter, born in Paris, Aug. 15, 1802. He was a pupil of Girodet, and from the outset of his career devoted himself exclusively to sea pieces. Among his best productions are a view of "Mont St. Michel at High Tide;" a "Steamboat landing Passengers at Dover;" a "Gale, Jan. 7, 1831, in Algiers Harbor;" "La Salle discovering Louisiana;" a "Naval Battle in the Chesapeake;" a "Shipwreck on the Coast of America." From 1838 to 1848 he executed more than 80 marine pictures for the Versailles museum. He is actively prosecuting his art, and visited the East in 1856.

GUEBRES, GHEBERS, GAVRES, or GAURES (*i. e.*, *giaours*, "infidels"), a term applied by the Mohammedan conquerors of Persia to the disciples of Zoroaster in that country who call themselves *Behendie*, "followers of the true faith," and are generally known by Europeans as fire-worshippers. The time when Zoroaster flourished is not agreed upon; a recent publication by a member of the sect who is regarded as an authority by his countrymen fixes it in the 6th century B. C. (*Tureekh-i-Zurtoosh-tee*, or "Discussion on the Era of Zoroaster," by Nourozjee Furdoojee, of Bombay, 1851). On the conquest of Persia by Alexander of Macedon the Zoroastrian religion began to decline, and in time became much corrupted. King Ardeschir Babekan (A. D. 226) reformed it, collected the sacred books, caused them to be translated from the Zend language into the vernacular dialect of

Persia, and built temples for the preservation of the sacred fire. Under the Mohammedan invaders in the 7th century the Zoroastrians were persecuted, and most of them embraced Islamism. A small remnant who clung to their old faith were finally allowed to settle in one of the most barren parts of the kingdom. They now number about 100,000 souls, dwelling chiefly in the city of Yezd and the province of Kerman, whence they migrate every spring to work for hire during summer in various parts of the country. They are an ignorant, uncouth, industrious people, who bear a high character for virtue in comparison with other Persians, but oppression has made them crafty. Another body of Zoroastrians left Persia at the time of the conquest, and wandered into Hindostan, where they found protection under a rajah of Guzerat. They are numerous in western India at the present day, and are there called Parsees from the country of their origin. They are honored by Europeans for their estimable qualities, are the richest and most influential of the native citizens of Bombay, and form about 115,000 of the population of Bombay and Colabba islands. They keep up an intercourse with their brethren in Persia. Their worship in the course of time became corrupted by many Hindoo practices, and after an ineffectual attempt by the Parsees *punchayet* or council to purify it, a society called the *Rahnumai Mardians*, or "Religious Reform Association," was organized in 1852 for the regeneration of the social condition of the Parsees and the restoration of the creed of Zoroaster to its original purity. The meetings and publications of this society are said to have had a considerable effect.—The Zoroastrian system recognizes one God, omnipotent, invisible, without form, the creator, ruler, and preserver of the universe, and the last judge. He is called Ormuzd, and sprang from primeval light, which emanated from a supreme incomprehensible essence called Zeruane Akerena, or the Eternal. Ormuzd created a number of good spirits to act as the medium of his bounty to men, and intrusted them with the guardianship each of a certain person, animal, or inanimate object. The sun is the "eye of Ormuzd," and like all the heavenly bodies is animated with a soul, comets (or "stars with tails") being under the care of the greater luminaries, and the dog star having general control over the whole sidereal system. The spirits of the stars have a beneficent influence upon the affairs of men, and can reveal the secrets of the future to those who understand their signs. Hence astrology has always been a favorite science with the Persians since this religion was established. The worship of idols, and indeed of any being except Ormuzd, is held in abomination; but a reverence for fire and the sun is inculcated, as they are emblems of the glory of the Supreme Deity. It is probably true, however, that the multitude in the course of time have forgotten that discrimination between the symbol and the object of their adoration which was undoubtedly taught by

Zoroaster. To Ormuzd as the source of all good is opposed Ahriman, the cause of evil; to worship the good spirit and hate the bad are the two fundamental articles of the Guebre and Parsee creed. Prayer, obedience, industry, honesty, hospitality, alms deeds, chastity, and the rare eastern virtue of truthfulness, are enjoined, and envy, hatred, quarrelling, anger, revenge, and polygamy are strictly forbidden. Fasting and celibacy are considered displeasing to Ormuzd. The sacred fire which Zoroaster brought from heaven is kept continually burning in consecrated places, and is fed with choice wood and spices. The Parsees took it with them to India, and they affirm that the flame has never been extinguished. The Guebres often build their temples over subterranean fires, one of their holiest spots being at Bakoo on the shores of the Caspian sea, where for ages without intermission flames have issued from calcareous rocks. (See BAKOO.) They never blow out a light, because the breath is thought to pollute it. The priests are supposed to pass their whole time in praying, chanting hymns, tending the fires on the altars, burning incense, and performing ceremonies. Their office is open to all aspirants among the Guebres, but the Parsees have borrowed from the Hindoos the ideas of hereditary priesthood and caste observance. Their funeral ceremonies are very peculiar. The cemeteries are built in the form of a circle enclosed by high walls and smoothly paved. In the centre is a pit toward which the pavement slopes on all sides. The corpses are laid naked on this pavement to be eaten by birds of prey, and when the flesh has been stripped off, the bones are swept into the pit, whence they are removed by subterranean passages when the receptacle becomes full.—The precepts of the Zoroastrian religion are contained in the Zend Avesta, or collection of sacred writings, which Zoroaster received from heaven. It is acknowledged that this collection was lost at the time of the Mohammedan conquest, but copies of portions of it were preserved, and some of the ablest European scholars have borne witness to the probable identity of the books of the modern fire-worshippers with those in use by the Persians 12 centuries ago.

GUEGUETENANGO, or HUEHUETENANGO, a department of Guatemala, in the W. part of the republic; pop. in 1853, 64,800. It has a great variety of climate and productions; but as most of its territory is high and mountainous, its principal products are wheat and wool. It is within the jurisdiction of Totonicapam, and is a part of the region called Los Altos, the districts of which at one time formed a distinct state of the republic of Central America.—GUEGUETENANGO, the capital, is situated on an extensive plain, with a mild climate, luxuriant with tropical productions, at the E. foot of the Cordilleras or dividing range of mountains of the continent, 125 m. N. W. of Guatemala; pop. 5,000. The ruins of the aboriginal city are half a league distant from the modern town.

GUELPH, a town of Canada West, capital

of the co. of Wellington, on the river Speed, 47 m. from Toronto; pop. in 1858, about 4,500. It is picturesquely built on several hills, and contains churches of 7 denominations, 2 branch banks, 8 insurance agencies, a grammar school, a library and reading room, 8 newspaper offices, numerous grist, saw, carding, and fulling mills, 4 tanneries, an iron foundry, and several breweries and distilleries. It is a first class station on the Grand Trunk railway, the N. terminus of the Galt and Guelph railway, which connects with the Great Western, and the S. terminus of a proposed railway to Saugeen, 70 m. distant. The town has a large retail country trade, and exports wheat and flour. There are valuable limestone quarries in the neighborhood.

GUELPHS AND Ghibellines (Germ. *Welfen*, Ital. *Guelfi*; and Germ. *Wiblingen* or *Waiblingen*, an estate belonging to the Hohenstauffen family, in the modern Württemberg), the names of two celebrated factions in Italy and Germany during the middle ages. Guelph or Welf is a baptismal name in several German families, but more particularly known in the history of a line of princes originally Italian, and traced to the 9th century. They emigrated to Germany two centuries later, and became divided into two branches, both possessing large estates in southern Germany, between the Brenner and St. Gothard. The present royal family of England, and the ducal line of Brunswick in Germany, trace their descent to a Guelphic princess, Kunegunde, the heiress of one of the branches, who became the wife of Alberto Azzo II., a prince of Este, born in 996. By this marriage the estates of the Guelphs were united to those of the Este princes in Lombardy. The son of Kunegunde, Guelph IV., duke of Bavaria, inherited also the estates of the senior branch of the Guelphs, called the Guelphs of Altorf, and became thus the founder, as it were, of the reunited Guelphs. The emperor Henry IV. bestowed upon him the duchy of Bavaria, but soon incurred his enmity by restoring a part of the Bavarian possessions to their rightful duke, Otho II. Guelph took up arms against the emperor, and, in league with other discontented princes, defeated him in several battles. He died in Cyprus in 1101, on his return from the first crusade. Guelph II., his son, at first supported the emperor Henry IV., but soon deserted him and embraced the cause of the usurper Henry V., of whom he became a great favorite. He died in 1120, without children; and the duchy of Bavaria was inherited by his brother, Henry the Black, who transmitted it to his son Henry the Haughty, in 1126. The latter married the daughter of the emperor Lothaire, and received from his father-in-law the duchy of Saxony. He subsequently disputed the crown of Germany with Conrad III.; was deprived of most of his possessions, and was put under the ban of the empire (1139). His brother, Count Guelph of Altorf, guardian of the famous Henry the Lion, his nephew, the son of Henry the Haughty, at that time but 10 years

of age, endeavored to recover for his ward possession of the confiscated duchies. Bavaria had been bestowed upon Leopold of Austria; Saxony upon Albert the Bear, of Brandenburg. The Saxons demanded a Guelphic prince; and Albert, at the emperor's desire, formally resigned the duchy to the youthful heir. In Bavaria Count Guelph was less successful. He was put under the ban of the empire as a rebel (1140), but ventured nevertheless to give battle to Conrad's troops, near Weinsberg, and was defeated. In this action were first heard those famous battle cries, which afterward became the most noted in Europe: "Strike for the Guelphs;" "Strike for the Ghibellines." Count Guelph became subsequently reconciled with the emperor, and accompanied him upon his bootless crusade. The wars of the Guelphs and Ghibellines, originating thus, soon became of much wider political consequence. In Germany they were speedily appeased, as we have seen; but they raged long after in Italy. Throughout the peninsula the family of the Guelphs found partisans everywhere weary of the yoke of the German emperors. The pope, irritated by German opposition in the matter of the investitures, declared for the Guelphs. The Lombard cities formed their league in favor of the Guelphic princes, while a similar league, under the patronage especially of Pavia, declared for the Hohenstauffen, by this time better known as the Ghibellines. The latter prevailed for many years. The emperor Frederic Barbarossa, notwithstanding the efforts of the indefatigable pope Alexander III., took Milan, and reduced the whole of Lombardy. The contest was resumed under Frederic II., who, after some successes, was dethroned. His grandson, Conradin, was the last of the race of Hohenstauffen. The Ghibellines had rallied about this unfortunate prince, who, at the age of 16, was beheaded at Naples by order of his perfidious enemy, Charles of Anjou (1268). The Guelphs meanwhile had been driven from both of their German duchies. The grandson of Henry the Lion, Otho (surnamed the Child), had done homage to Frederic II. in 1235. He had been thereafter created by this emperor duke of Brunswick, and held some remnant of his ancestors' estates, as fiefs of the empire. From him are descended the reigning houses of England, Hanover, and Brunswick. Twenty years later the contest became but a private feud of various Italian factions; of families sometimes in the same city. In 1259 the marquis of Este, a Guelph, triumphed over a Ghibelline faction of Verona, headed by Ezzelino the Ferocious. This nobleman, the third seignior of Romano of his name, was born at Onara in 1194, and was concerned almost from boyhood in the quarrels of his family with the house of Este. He became podesta of Verona, and having declared for the emperor Frederic II. in his war with the Lombards, was rewarded with the government of Padua, which he resolved to make the foundation of an independent state. He conquered Vicenza, Verona, Fel-

tre, Belluno, and Bassano in rapid succession, exterminated the noblest families of his opponents, and acquired by his cruelties the title of the "Scourge of God." Over 50,000 persons are said to have perished by his order in prison or on the scaffold. At length a powerful coalition was formed against him, and having been taken in battle, after receiving a wound in the head, he refused all aliment, medicine, and consolation, and tore off the bandage from his wound in order to hasten his death. His brother Alberic was captured Aug. 25, 1260, and put to death with great torture. With him ended the family of Ezzelino da Romano. At Milan, in 1277, the Torriani, Guelphic chiefs, were compelled to surrender power to the Visconti, representing the Ghibellines. At Florence, in 1258, Silvester de' Medici, of a Guelphic faction, known then as the whites (*bianchi*) against the blacks (*neri*), by which name the Ghibellines had come to be designated, deprived the family of the Uberti of their power, and gave to the Florentines a form of republican government. Pisa, after a disastrous war with Genoa, fell under the domination of the Guelphs in 1284. The last of the Roman tribunes, Cola di Rienzi, recovered momentary power for the Guelphs in 1347. Rome had for years vacillated between oligarchy and democracy, Ghibellines and Guelphs, as those factions were now designated. In general the former were partisans of imperial and feudal hierarchy; the latter of the church and national independence. Their contests, after desolating Italy for 400 years, yielded at length in some degree to the effects of self-exhaustion. The French invasion of 1495 was mainly instrumental, however, in giving diversion to the national mind, and interrupting a party spirit unsurpassed in the histories of obstinate and cruel domestic wars.—In honor of the Guelphic founders of the house of Brunswick-Hanover, there was established in 1815 by the Hanoverian sovereign (the prince regent of England) an order of knighthood, known as the Guelphic order of Hanover. The insignia are a cross of gold, bearing a medallion, on the red field of which is a silver horse upon a green mound (sinople); the motto is: *Nec aspera terrent*.

GUERCINO. See BARBIERI.

GUERICKE, HEINRICH ERNST FERDINAND, one of the principal representatives of the old Lutheran school of theology, born in Wettin, Feb. 28, 1808. He was graduated at the university of Halle, and appointed professor there in 1829. Next to Scheibel of Breslau, he was the most influential opponent of the union between the Protestant churches in Prussia, and of the new *agenda* or liturgy which the government had introduced into the services of the church. He was consequently dismissed from the university in 1835, officiated during 8 years as preacher of the old Lutheran congregation in Halle, and was not permitted to resume his academical functions until 1840. He has edited since that year the *Zeitschrift für Lutherische Theologie*, in concert with Rudel-

bach. His principal works are: *Historisch-kritische Einleitung in das Neue Testament* (1843), the 2d part of which appeared in Leipzig in 1854 under the title of *Gesammte Geschichte des Neuen Testaments, oder Neutestamentliche Inaugural- und allgemeine Christliche Symbolik* (2d ed. 1846); *Lehrbuch der Christlichen Archäologie* (1847); *Handbuch der Kirchengeschichte* (7th ed. 1849). The last named work is in course of translation by Prof. Shedd (1 vol. 8vo. published, Andover, 1857).

GUERICKE, OTTO VON, a German experimental philosopher, born in Magdeburg, Nov. 20, 1602, died in Hamburg, May 11, 1686. After a long residence in some of the chief university towns of Europe, where he studied law and various branches of science, he returned to Magdeburg, of which city he was for nearly 40 years burgomaster. As a natural philosopher he is chiefly known by his discoveries as to the nature and effects of air. In 1650 he invented the air pump, subsequently perfected by Robert Boyle and others, and which in 1654 he exhibited at the diet at Ratisbon to the emperor Ferdinand III. and the great dignitaries of the empire. He illustrated the force of atmospheric pressure by fitting together two hollow brass hemispheres, which, after the air within them had been exhausted, could not be pulled apart by the force of many horses. The air pump used on this occasion is still preserved in the museum of Berlin. He also invented a species of barometer. As an astronomer he was one of the first to express the opinion that the return of comets might be calculated. He published several treatises in natural philosophy, the principal of which, *Experimenta Nova, ut vocant Magdeburgica*, &c. (Amsterdam, 1672), contains an account of his experiments on a vacuum.

GUERRILLA (Sp. *guerrilla*, little war), a kind of desultory warfare carried on by the local population uninstructed in the training of regular troops. This sort of war is termed irregular, though it must not be regarded as devoid of organization and system; that word being used to distinguish the combatants under this category from those of the permanent armies. Discipline and obedience are maintained with rigor, and punishments are summary and severe; the personal influence, example, and orders of the chief supersede in a great measure the military code. A well wooded and undulated country is best adapted to such warfare. Spain is especially remarkable for this style of defensive home fighting; it was introduced there by Quintus Sertorius when a fugitive and proscribed from Rome. The population of Spain, being favorable to Sertorius, became willing and apt pupils; they furnished him with accurate intelligence of every movement of the great Roman generals Pompey and Metellus, by whom he could never be brought to fight a pitched battle, though he surprised, worried, and destroyed in detail their legions. During the Peninsular war the Spanish guerrillas did essential service to the English army by cut-

ting off French convoys, couriers, &c. The great modern master of guerilla warfare, Zumalacarre-gui, first raised the Carlist cause to importance by this method of warfare in the Basque provinces, and he performed the unusual feat of organizing out of his irregulars some very good troops of the line. When a party of his guerillas was very hard pressed by the superior forces of the enemy, it would disperse and mingle in the peaceful and agricultural occupations of the peasantry; and so soon as the tempest had blown over, it would reappear. Such a system can only be carried on when the rural population is devoted to the cause. The operations of Abdel Kader against the French in Algeria, and those of Shamyl against the Russians in the Caucasus, partake of this character. Insurrectionary improvised combats of the inhabitants from behind barricades in cities must not be confounded with guerilla warfare; neither must the manœuvring of light infantry be so mistaken, nor the war by small detached columns of regulars; because, though the men and the detachments are comparatively isolated and independent, both modes are mere modifications of the movements of trained troops.

GUÉRIN. I. JEAN BAPTISTE PAULIN, a French painter, born in Toulon, March 25, 1788, died in Paris, Jan. 16, 1855. He was the son of a locksmith, and at first made a living as a workman, devoting meanwhile all his leisure hours to drawing. Having saved enough money to enable him to go to Paris, he accepted a menial office in the studio of Gérard, where he secretly executed a large picture, "Cain after the Death of Abel," which was greatly admired at the exhibition of 1812, and purchased by the government. Among his paintings, some of which are mythological, while most of them are of a religious character, are the "Descent from the Cross," which obtained a gold medal in 1817, and was presented to the Roman Catholic cathedral in Baltimore, U. S., by Louis XVIII.; "Anchises and Venus," purchased by the French government in 1822; "Adam and Eve expelled from the Garden of Eden," his best performance, and one of the masterpieces of the French school. He left also many portraits which are highly valued; those of Charles X. and Lamennais among the number. II. PIERRE NARCISSE, a French painter, born in Paris, May 18, 1774, died in Rome, July 16, 1833. He was a pupil of Regnault, and had a very imperfect education in his art and very little substantial merit; but his happy selection and dramatic treatment of subjects rendered him popular. His "Marcus Sextus returning from Exile," exhibited in 1800, at a time when so many *émigrés* were permitted to return to France, created a great sensation. His "Phædra and Hippolytus" was scarcely less successful in 1802. His subsequent works were, however, less popular.

GUERNSEY, the westernmost of the Channel or Anglo-Norman islands, belonging to Great Britain, and lying in the English channel, 28 m. from the N. W. coast of France, and 68 m. from

England, between lat. 49° 24' and 49° 38' N., and long. 2° 32' and 2° 48' W.; area, 16,000 acres; pop. in 1851, 29,757. It is of triangular form, 9 m. in length and from 8 to 4 in breadth. The surface toward the N. is low and level, but toward the S. is comparatively hilly and elevated. The coast is deeply indented with excellent harbors, and in some places rises into bold precipitous cliffs 270 feet high. The climate, though variable, is temperate and healthy. The soil is fertile, but owing to the minute subdivision of property and the want of capital, agriculture is generally in a backward state. The principal productions are wheat, barley, oats, rye, potatoes, fruit, cider, wine, butter, pigs, and cattle. The trade of this island is rapidly declining. The exports are mostly apples, cider, wine, potatoes, and granite; the imports, corn, flour, manufactures, sugar, coffee, &c. The former, in Guernsey, Jersey, &c., amounted in 1856 to £294,678, and the latter to £718,975. The inhabitants are a simple and thrifty race, and speak a dialect of that Norman French which has been obsolete for centuries save in these islands. The government is vested in a lieutenant-governor and the "states," which are composed of 37 officials, partly elected by the people and partly appointed by the crown. Capital, St. Peter Port.

GUERNSEY, an E. co. of Ohio, drained by branches of Muskingum river, and abounding in coal; area, 460 sq. m.; pop. in 1850, 80,438. It has a hilly surface, with a soil of moderate fertility. The slopes afford good pasturage, and in many places are covered with vineyards from which wine is produced. The productions in 1850 were 217,375 bushels of wheat, 801,964 of oats, 682,757 of Indian corn, 16,260 tons of hay, 1,788,181 lbs. of tobacco, and 10,500 bushels of salt. There were 17 grist mills, 17 saw mills, 2 newspaper offices, 77 churches, and 8,135 pupils attending public schools. The county was settled mainly by emigrants from Guernsey, and named from that island. It is traversed by the central Ohio railroad, connecting Columbus with Wheeling, Va. Capital, Cambridge.

GUERRAZZI, FRANCESCO DOMENICO, an Italian author and politician, born in 1805, was a successful lawyer at Leghorn previous to the outbreak of the revolutionary movement of 1847 and 1848, in which he took a prominent part. Imprisoned for a short time in 1848, he had no sooner recovered his liberty than he placed himself in relation with Mazzini, Gioberti, and other agitators, founded a republican journal at Florence, was chosen a deputy to the national assembly of Tuscany, and appointed minister of the interior in Oct. 1848. After the departure of the grand duke from his capital (Feb. 7, 1849), Guerrazzi became a member, and in March the chief of the provisional government, which was overthrown in the following month. He was arrested April 14, and removed in June to the state prison of Volterra, where he was detained until July, 1858, when

his trial was brought to a close. Sentenced to perpetual banishment, he proceeded to Marseilles, and not being permitted to reside there, went to Bastia in Corsica. In 1855 he was allowed to return to Piedmont, and took up his abode in Savona, and more recently he has resided in Genoa. While in prison he wrote a defence of his political course (*Apologia della vita politica di F. D. Guerrazzi*), which had given rise to much comment on account of his unwillingness while in power either to proclaim the republic or to consent to an annexation to the republic of Rome, and still less to Sardinia. He has written *La battaglia di Benevento* (Florence, 1828), and other romances, chiefly historical, which reflect his strong hatred of the opponents of the political regeneration of Italy; and some of them, especially "Isabella Orsini" (about 1830) and "Beatrice Cenci" (1854), are marked by a glowing and extravagant style. English translations of the latter, by Luigi Monti and also by Mrs. Watts Sherman, were published in New York in 1858, and of the former by Monti in 1859. In 1856-'7 he published *L'asino*, an allegorical political satire.

GUERRERO, VICENTE, a president of Mexico, born in the latter half of the 18th century, executed at Cuilapa, Feb. 14, 1831. He was of Indian extraction, and distinguished himself in the Mexican war of independence, being at one time the only Mexican chief who held out against the Spanish troops. After the overthrow of Iturbide he became the leader of the Yorkinos, or popular party, and rendered important service to the administration of President Victoria by quelling insurrections. In 1828 he became the candidate of the Yorkinos for president, but was defeated by Pedraza. Santa Anna and the Yorkinos immediately raised the standard of revolt, declaring the election of Pedraza illegal; and after a brief contest, in which the influence of the American minister in Mexico, Mr. Poinsett, was exerted in behalf of Guerrero, an accommodation was agreed to, and the latter was declared president, and Bustamante vice-president. Guerrero took office in April, 1829, and during his brief administration witnessed the overthrow of the last Spanish army sent against Mexico, and the abolition of slavery. To meet the exigencies of the Spanish invasion, he had been appointed dictator, and upon his refusal to relinquish the extraordinary powers thus conferred, Bustamante marched from Vera Cruz against the capital in the latter part of 1829. Guerrero advanced to meet him, but was deserted by his troops, and resigned his office to Bustamante. A few months afterward he made an attempt to recover it, but being defeated by Gen. Bravo at Valladolid, he fled to Acapulco, where he was betrayed into the hands of his enemies. He was subsequently tried by a military commission, and shot.

GUESCLIN, BERTRAND DU, constable of France, born at the chateau of La Motte Bron, near Rennes, in Brittany, about 1820, died be-

fore Randon in the south of France, July 13, 1380. He belonged to an ancient family of the lesser nobility, was athletic, but ill formed and ugly, and though dull at his studies excelled in all rude sports and manly exercises. At the tournament given at Rennes in 1338 in honor of the marriage of Charles de Blois with Jeanne de Penthievre, unknown to his father, he entered the lists and unseated the best knights of Brittany, bearing away the great prize of the day. In the bloody war between the rival claimants of the dukedom of Brittany, the count of Blois and Jean de Montfort, he joined the former, and, too poor to furnish retainers of his own, put himself at the head of a band of adventurers. After the defeat and capture of Charles he still kept the field in his cause, and was one of the Breton noblemen who went over to England to treat for his release. In 1356, after the battle of Poitiers, Rennes being besieged by the duke of Lancaster, Du Guesclin forced his way into the place with a few followers, and defended it till the siege was raised in June, 1357. Charles de Blois gave him in recompense the lordship of La Roche d'Arien. Charles V. upon his accession sent him with a body of troops against the combined forces of England and Navarre, over which he gained a great victory at Cocherel, on the banks of the Eure, in May, 1364. For this exploit he was made count of Longueville and marshal of Normandy. In the latter part of this year, however, he was himself defeated and taken prisoner by Sir John Chandos at Auray in Brittany. Peace being concluded with England, the *grands compagnies* that Du Guesclin had employed with so much success began to plunder the richest provinces of France, and to rid the kingdom of these adventurers Charles was induced to procure the release of their leader at a ransom of 100,000 crowns. Du Guesclin persuaded them to follow him in a crusade against the Moors of Spain, although his real object was to aid Henry of Trastamare in his struggle with his brother Pedro the Cruel for the throne of Castile. On their way southward they levied a black mail of 100,000 francs upon the pope at Avignon, beside exacting from him absolution and his blessing. Du Guesclin, however, insisted that the money should be considered a levy upon the clergy and not upon the people. The *compagnies* found little difficulty in establishing Henry upon the throne, but Don Pedro having secured the alliance of England, they were defeated by the Black Prince, and Du Guesclin was captured. The chivalric conqueror, hearing that it was rumored that he feared to release his captive, offered to ransom him for 100 francs or less if he chose. Du Guesclin stoutly resisted the offer, declaring that he was worth 100,000 gold florins, and that if the kings of France and Castile would not ransom him there was not a woman in the kingdom who would not contribute to the sum. Upon his release he again joined Henry, whom he placed firmly on the throne, after defeating Don Pedro and

the Moors who had embarked in his cause. Recalled to France by Charles in 1370, he was created constable, and for several years was employed in the west and south against the English, driving them back step by step, and regaining many towns and places long occupied by them. During this struggle the duke of Brittany had been forced to remain neutral; but fancying himself threatened by Charles, he sought the alliance of England, which afforded Charles a pretext for invading the province and declaring its annexation to France. Du Guesclin, who could not look unconcerned upon this attempt to destroy the independence of his native country, advised less hasty counsels, and Charles had the folly to doubt the fidelity of his constable. The latter, indignant at the affront, resigned his sword of office, and departed to seek an asylum at the court of Castile. On the way he paused before Randon, which was besieged by a French army under Marshal Sancerre, and there sickened and died the day before the capitulation. The commander of the garrison, marching out at the head of his troops, placed the keys of the fortress upon the dead body of the hero.

GUESS, GEORGE, or SEQUOYAH, a half-breed Cherokee Indian, inventor of the Cherokee alphabet, born about 1770, died in San Fernando, northern Mexico, in Aug. 1843. He cultivated a small farm in the Cherokee country of Georgia, and was already known as an ingenious silversmith, when in 1826 he invented a syllabic alphabet of the language of his nation, comprising 85 characters, which was applied to writing and printing with complete success. Cherokee children were able to master the alphabet in a short time, and to write letters to their friends, and a newspaper called the "Phoenix," printed chiefly in Cherokee, was established 2 years afterward. Guess used part of the English alphabet in making up his own, although he was unable to read, and knew no language but the Cherokee. Having refused to be converted to Christianity, he lamented, it is said, his invention, when he saw that it had been used for translating the New Testament into Cherokee. He accompanied his tribe in their migration beyond the Mississippi, and resided for some time in Brainerd. In 1842 he went with other Indians into the territory of Mexico, where he was attacked by a sickness which ultimately proved fatal.

GUEST, in law, a transient person, visiting an inn for rest or food. For the law respecting guests, and the difference between guests and boarders, see INNKEEPER.

GUETTARD, JEAN ÉTIENNE, a French natural philosopher, born in Étampes, Sept. 22, 1715, died in Paris, Jan. 7, 1786. He studied medicine in Paris, and having obtained his degree, devoted all his attention to the natural sciences under the direction of Réaumur. In 1743 he was admitted to the academy of sciences. His contributions to scientific knowledge are highly prized. Among his numerous papers on botany, the *Mémoire sur la transpiration in-*

*sensible des plantes* (1752-'8) deserves special mention. His papers on zoology contain much curious information, and relate several interesting experiments; but his most important researches were connected with geology. His *Mémoire et carte minéralogique sur la nature et la situation des terrains qui traversent la France et l'Angleterre* (1751) established the geological identity of these two countries. His *Mémoires sur quelques montagnes de France qui ont été des volcans* (1752) were the foundation of the Plutonic theory. In his *Mémoire sur les granits de France comparés à ceux d'Égypte* (1755), he served the practical interests of France; which he most materially advanced when he discovered near Alençon a kind of earth very similar to the Chinese kaolin, thus giving birth to the manufacture of earthenware in that city, and leading the way to that of French porcelain. In his zeal for the diffusion of scientific knowledge, he undertook a geological map of France; but the scantiness of data then collected did not permit him to complete it.

GUGGENBÜHL, LOUIS, a Swiss philanthropist, born in Zürich about 1812. He took the degree of M.D. in 1836, and spent a few weeks in a tour through his native country. It was on this journey that his attention was first drawn to the condition of the cretins, who are found in great numbers in the valleys of the Bernese Alps, and he resolved to enter upon a thorough investigation of the causes and means of cure of cretinism. The field was a new one, for up to that time the improvement of the cretin had been considered impossible. Dr. Guggenbühl spent 8 years in his investigations, 2 of which were passed in the little village of Seruf, in the canton of Glarus, where he was instrumental in restoring several to health. At the end of this period he had determined to devote himself and his little patrimony to the work of improving the physical, mental, and moral condition of these unfortunate beings. Deeming an elevated situation and pure air essential to their successful treatment, he purchased in 1840 a tract of about 40 acres on the Abendberg above Interlachen, in the canton of Bern, and erected some humble but commodious buildings, sufficient for the accommodation of about 30 children. Here, though at times disheartened by pecuniary embarrassments, and somewhat less sanguine of universal success than at the beginning, he has demonstrated that many of the cretins are capable of great improvement, and some of complete cure. Several of his former pupils are now occupying respectable positions in society. In 1852 he published a work on the cure of cretinism, and since that time several essays and reports of cases have appeared from his pen. He has repeatedly visited England, where he has been received with great attention; and the first movement for the training of idiots and cretins in Great Britain was in a very considerable degree brought about by his influence on Drs. Twining, Conolly, and others.



GUIANA, GUYANA, or GUAYANA, a territory of South America, on the N. E. coast, bounded N. and N. E. by the Atlantic ocean, E. and S. by Brazil, and W. by Brazil and Venezuela, and lying between lat.  $0^{\circ} 40'$  and  $8^{\circ} 40' N.$ , and long.  $51^{\circ} 30'$  and  $61^{\circ} W.$ ; area loosely estimated at 94,000 sq. m., but the unsettled position of the boundaries renders a near approach to accuracy impossible. The term Guiana was formerly applied to all that extensive region comprised between the mouths of the Orinoco and Amazon, and extending S. as far as lat.  $3^{\circ} 30' S.$ ; but about  $\frac{1}{2}$  of this tract are now comprised within the boundaries of Brazil and Venezuela. In its present restricted sense, the territory is divided into the three colonies of British, Dutch, and French Guiana. The coast is low, flat, and skirted by a mud bank, so that vessels drawing more than 12 feet of water cannot anchor within 3 miles of land. Dangerous rocks and quicksands increase the difficulty of navigation near the shore, and the rivers are generally obstructed by accumulations of sand or mud at their mouths. The most important streams are the Essequibo, Demerara, Berbice, Corentyn, Surinam, Marowynne, and Oyapok, all of which discharge into the Atlantic. The last forms the E. boundary with Brazil. For a distance inland varying from 40 to 70 m. the country preserves the low flat character of the sea coast, its average elevation being about that of high water; and in some places, particularly where the soil has been consolidated and depressed by drainage, dikes are necessary to keep out the sea. Beyond this plain runs a range of hills from 50 to 200 feet high; and back of these stretch successively an elevated plateau, broken by occasional eminences, a second ridge of hills, a second low plain, and on the S. and W. boundaries mountain chains belonging to the Parima system and sending off several spurs into the interior. Their height does not exceed 4,000 feet. The prevailing geological formation is granite, which abounds in the highlands, and forms the substratum of the alluvial country along the coast. Gneiss, trap, sandstone, white quartz, red agate, and rock crystals are also met with, and very pure white clay is found in the Essequibo river. The soil is exceedingly fertile, and the proportion of cultivable land is very large. During the rainy season the plains are covered with water to the depth of one or two feet, and the deposit left on its subsidence is so rich that it has been exported to Barbados for agricultural purposes. The depth of this mould is about 12 feet. Marshes occupy a considerable part of the surface, and there are vast savannas which afford excellent pasturage. The interior in some places is sandy and rocky. The climate, except in certain localities, such as Cayenne, is mild and salubrious, and much more agreeable than that of the West India islands. The thermometer seldom rises above  $90^{\circ}$ , or falls below  $72^{\circ}$ , except far inland, where it ranges from  $65^{\circ}$  to  $84^{\circ}$ . The principal cause of this moderate

temperature is probably the trade wind, which reaches the coast after it has been cooled by its passage across a wide expanse of ocean. On the coast there are 4 seasons, 2 wet and 2 dry, the former lasting from the middle of April till September, and from the middle of November till the middle of January, and the latter from the middle of January till the middle of April, and from September till the middle of November. In the interior there are only 2 seasons. Thunder storms are frequent and violent, and slight shocks of earthquake are sometimes felt, but tornadoes never occur. Vegetation is luxuriant, and almost universal. The hills and river banks are overgrown with timber, much of which is of enormous size and high value. Mahogany, iron-wood (so called from its great hardness), the bullet tree, the cuamara or Tonquin bean tree, remarkable for its sweet-scented pulse, the gigantic mountain cabbage, the silk cotton tree, the great mira tree, the red mangrove, the pipeira, and the cocconut are some of the principal forest trees. Cacao, guava, tamarinds, the aviato or avogato pear, plantains, bananas, and pineapples are among the most highly prized fruits. Cotton of good quality and coffee are produced, two crops of each being grown annually. The *palma Christi*, from the nuts of which castor oil is procured, the cassava, whose roots are ground into meal for making bread, ipecacuanha, ginger, and Indian yams, are also found. The flora is rich and varied, and includes the *Victoria regia*, the grandest of water lilies. The cultivated crops are tobacco, indigo, maize, rice, and sugar cane. The culture of cotton has been almost abandoned on account of the inability of the planters to compete with the United States. Wheat is not raised successfully. The principal animals are the jaguar, cougar, armadillo, ant bear, sloth, agouti, monkeys of many varieties, lizards, alligators, the manatee or sea cow, vampire bat, boa constrictor, black cattle of large size but tough flesh, and most of the domestic animals of Europe. Among the feathered race are the parrot, humming bird, peacock, spoonbill, and Muscovy duck. The inhabitants consist of aborigines of numerous tribes and many shades of color, Africans, and European settlers. The principal Indian tribes are the Warran or Guaraunos, Arawaak, Caribs, and Akawai. The Warran are the tallest, most industrious, and most sprightly. They dwell between the Orinoco and the Essequibo, in the N. W. part of British Guiana. The Akawai inhabit the mountains of the W., further inland than the preceding. The Arawaak, who are the dirtiest, darkest, laziest, and least courageous of all the tribes, are found along the coast from Demerara to Surinam; the Tajiras, a peaceable and indolent people, live E. of Surinam; and the Pianaghottoes and Caribs occupy the back country, the former maintaining an implacable hostility to the whites, and the latter being distinguished for their mild temper and handsome persons. The Indians will sometimes work for the colonists, but without perseverance

or regularity. Many of them support themselves by trading. The tribes have no common language.—**BRITISH GUIANA**, or **DEMERRARA**, is the largest of the colonial divisions, and comprises the W. part of the country, extending along the coast from the mouth of the Orinoco to the Corentyn, which separates it from Dutch Guiana; area, about 50,000 sq. m.; pop. in 1851, 185,994, of whom 96,467 were whites, 7,682 coolies, and 14,251 Africans. The proportion of males to females was as 6 to 5. The W. part is hilly, and occupied almost wholly by Indians. A few settlements are scattered along the Pomaroon and Essequibo rivers, but most of the European establishments are on the Demerara, Berbice, and Corentyn, extending from the sea about 50 m. inland, and on the coast between the mouths of these rivers. The principal places are Georgetown at the mouth of the Demerara, and New Amsterdam at the mouth of the Berbice. The colony is divided into 3 counties, Essequibo, Demerara, and Berbice, which before their consolidation under one government in 1831 formed so many separate colonies. The principal productions are sugar, molasses, rum, coffee, timber, dye stuffs, &c. The yield of coffee is decreasing, and that of cotton has almost entirely ceased. The movements of commerce in 1853, '4, and '5 were as follows:

Years.	Imports.	Exports.	Vessels entered.		Vessels cleared.	
			No.	Tons.	No.	Tons.
1853...	2347,198	21,014,944	675	124,938	684	103,108
1854...	216,498	1,405,532	638	128,885	633	111,500
1855...	886,016	1,831,371	698	125,151	665	110,790

The law by which the colony is governed is founded upon the old Dutch law promulgated in 1774. The administration is vested in a governor, in a court of policy, which has ordinary legislative power, and consists of the governor with an equal number of official and non-official members, and in a combined court, which has control of the finances, and is composed of the court of policy and certain persons called financial representatives. These last and the non-official members of the court of policy are elected—the former by the people, male and female, and the latter by a college of electors chosen by popular vote. A property qualification is required of voters. The revenue in 1855 amounted to £255,008, and the expenditure to £239,511. British Guiana was discovered, according to some, by Columbus in 1493; according to others, by Vasco Nunez in 1504. It was settled by the Dutch in 1580, and taken by the English in 1781, but restored to Holland in 1783. Thirteen years later it was again seized by Great Britain, in 1801 again restored, and in 1803 finally captured by the British, to whom its possession was confirmed in 1814. Slavery was abolished in 1834, but the apprentice system continued in force until 1838.—**DUTCH GUIANA**, or **SURINAM**, is the central of the 3 colonies, and is bounded W. by the Corentyn river and E. by the Marowynne;

area estimated at 30,000 sq. m.; pop. in 1856, 52,533, of whom about  $\frac{1}{4}$  are negroes. The principal settlements are Paramaribo, the capital, situated on the Surinam about 10 m. from its mouth; Batavia, Orange, and Fredenburg, on the coast; and Wilhelmsburg, Magdenburg, and Jews' Town, in the interior. The hills are peopled chiefly by the Maroons or runaway negroes. About 27,000 of the inhabitants are Protestants (including 21,845 Moravians), 9,500 are Roman Catholics, and 1,414 are Jews. Commerce is carried on chiefly through the port of New Amsterdam, and the principal exports are coffee, molasses, sugar, and rum. The commercial statistics in 1853 were as follows: imports, \$816,474; exports, \$1,812,118; vessels entered, 201, tonnage 36,858; vessels cleared, 190, tonnage 36,858. About  $\frac{1}{4}$  the commerce is with the mother country, and  $\frac{1}{4}$  with the United States. The government is exercised by a governor-general appointed by the crown and a council elected by the freeholders. The revenue in 1850 amounted to \$436,072, and the expenditures to \$416,959. The colony shared the history of the Dutch settlements W. of the Corentyn until the final appropriation of the latter by Great Britain in 1803, the name Surinam having been applied to both Dutch and British Guiana. Slavery was abolished in Dutch Guiana in 1851, but by way of compensation to the owners the negroes are to work as apprentices without pay until 1863.—**FRENCH GUIANA**, or **CAZENNE**, is the easternmost colony, and extends from the river Marowynne to the Oyapok; area, about 14,000 sq. m.; pop. in 1851, 17,625, showing a decrease of 2,170 since 1846. The colony is divided into the districts of Cayenne and Sinamari, and the capital, largest town, and principal commercial port is Cayenne, situated on an island of the same name at the mouth of the rivers Cayenne and Oyac. The principal plantations are also on this island. The colony is abundantly watered, and, in addition to the staples common to this part of the coast, produces pepper, cloves, cinnamon, and nutmegs, which have been introduced from Asia, and, with the exception of nutmegs, are cultivated with great success. The trade, valued at \$2,500,000 or \$3,000,000 annually, is almost wholly with the mother country. The government is vested in a governor and privy council, and an assembly of 16 representatives chosen by the people. The first French settlements in Guiana were made in 1604. About 12,000 emigrants were sent out by the government in 1763, but nearly all fell victims to the climate, which was then far more deadly than it is now. The settlements were seized by the allied forces of Great Britain and Portugal in 1809, but restored to France by the treaty of Paris in 1814. Since 1848 the colony has been a penal settlement, for an account of which see **CAZENNE**.

**GUIBERT**, **JACQUES ANTOINE HIPPOLYTE**, count, a French soldier and writer, born in Montauban, Nov. 11, 1743, died May 6, 1790. He served during the 7 years' war, and was so

much impressed with the superiority of the Prussian tactics that he began to advocate their introduction into the French army. In 1769 he served with distinction in Corsica. In 1772 he published his *Essai général de tactique*, with an introductory *Discours sur l'état actuel de la politique et de la science militaire en Europe*. This work made a sensation, and its author, who was at once young and handsome, became one of the lions of fashionable society. It was at this time that Mlle. de Lespinasse, the mistress of D'Alembert, fell in love with him and wrote him passionate letters, which were afterward published. On a journey through Germany, Guibert was received with honor by the emperor Joseph II. and by Frederick the Great, which circumstance still more enhanced his popularity at home. He now composed academical discourses and national tragedies; but his efforts were not crowned with success either at the academy or on the stage. In 1775 Count St. Germain, having been appointed minister of war, gave him employment, but he soon went out of office with his patron. In 1779 Guibert produced his *Défense du système de guerre moderne*, his best performance. His military works, including those above cited, were published in 1808 by his widow. His literary works followed in 1806 and 1822.

GUICCIARDINI, FRANCESCO, an Italian historian, born in Florence in 1482, died there in May, 1540. At the age of 28 he held a professorship of law, and was afterward appointed ambassador to Ferdinand the Catholic. He was soon called to the court of Leo X., who made him governor of Modena and Reggio, which dignity he retained under the pontificate of Adrian VI. Clement VII. sent him to the Romagna, where he succeeded in quelling the conflicts of the Guelphs and Ghibellines. As lieutenant-general of the pope he defended Parma against the enemy, and subdued the revolted city of Bologna, after which he retired to Florence and commenced his history. On the assassination of Alessandro de' Medici, he exerted himself to defeat the project of the senate for restoring the republican form of government. Cosmo de' Medici was made governor by his influence, with a fixed income, and the real power was vested almost entirely in the council. But the new governor soon exchanged this title for that of duke, assumed absolute power in the state, and Guicciardini, who had been attached to him, resigned his office and retired. Of his "History of Italy," the first complete 16 books appeared in 1561, edited by his nephew. A few years afterward 4 more were added, but these are not complete. It has since been often reprinted in 20 vols., but the best edition is that by Rosini, 10 vols. (Pisa, 1818-'20). Among the other remains of Guicciardini are *Consigli ed avvertimenti*, &c., a part of his correspondence published by Bernigio under the title *Considerazioni civili sopra l'istoria di Francesco Guicciardini* (Venice, 1582), and under that of *Legazione di Spagna* (Pisa, 1825).

GUICOWAR, or GYKWAR, DOMINION OF THE, or of BARODA, a state in the province of Guzerat, Hindostan, subsidiary to the British and subordinate to the presidency of Bombay; area, 4,899 sq. m.; pop. 325,526. It consists of the greater part of the peninsula of Guzerat, with some other detached portions, the whole lying between lat. 20° 40', and 24° N., long. 69° and 74° E., and being bounded S. W. by the Indian ocean, N. by the gulf and runn of Outch and the territories of Oodeypoor, and E. by some minor Rajpoot states and a portion of the Bombay presidency. It is one of the richest regions of India, watered by the Sabermutty, Nerbudda, and other rivers, producing grain, cotton, sugar, indigo, tobacco, oil seeds, pulse, and flax, and having a long line of sea coast with many advantages for commerce. The trade is chiefly in grain and cotton. The inhabitants comprise Hindoos, Mohammedans, Parsees, and wild aboriginal tribes, the first being largely in the ascendant. Baroda is the capital and seat of the British resident. The guicowar was originally a prince of the great Mahratta confederacy, at the head of which were the descendants of Sevajee. In 1782 Damajee Guicowar threw off his allegiance, but having fallen by treachery into the peishwa's hands, was forced to yield one half of his possessions and acknowledge that he held the other half in fief to the Mahratta sovereign. During one of the many struggles for supremacy which took place between Damajee's descendants, the assistance of the East India company was invoked to put down a pretender to the throne. By a treaty in 1803 the British virtually acknowledged the guicowar's independence, which has since been gradually secured under a sort of British protection. In 1828 a portion of his territory was placed under sequestration by the East India company in satisfaction for certain debts.

GUIDI, TOMMASO. See MARASCO.

GUIDO ARETINO. See ARETINO.

GUIDO RENI, an Italian painter of the Bolognese school, born in Bologna in 1575, died there in 1642. He studied under Denys Calvaert until the rising reputation of the Carracci induced him to enter their academy, where he became the favorite pupil of Ludovico Carracci. His pictures at this time are evidently in the style of Caravaggio. The *Madonna della Pietà* and the "Crucifixion" in the gallery at Bologna are good specimens of his productions at this period. Caravaggio's naturalism, however, alarmed the Carracci, and to a hint from Annibale as to the manner in which it might be successfully opposed is ascribed Guido's adoption of the style by which he is generally known. He afterward went to Rome, where his first picture, the "Martyrdom of St. Cecilia," was very successful. He received an order from the pope to decorate the private chapel of the palace of Monte Cavallo, but upon the completion of the work became disgusted with the parsimony of the papal treasurer and returned to Bologna, where he painted the "Massacre of

the Innocents." Recalled by the pope to Rome, he executed a number of important works, including his frescoes of the "Aurora" in the Rospigliosi palace, the "Concert of Angels" in the apse of the Capella S. Silvia, the "St. Andrew" in the chapel of that name, and the painting of "Fortune" in the gallery of the capitol. He was invited to Naples, and had nearly finished the "Nativity," now in the choir of S. Martino, when he was driven away by the jealousy of the Neapolitan artists. The remainder of his life was passed at Bologna. The study of Raphael and of the antique had meanwhile effected a further change in his style, and he aimed at an ideal, which, however, is too often but an empty abstraction, devoid of individual life. At this period he gave himself up to play, and painted rapidly and carelessly to retrieve his losses. Many of his later works are consequently unfinished, and it is said that some which bear his name are works by his pupils to which he applied the finishing touches. The best of this period are his "Assumption," in the gallery at Munich, and the Madonna with angels, called *Il Pallione*, now in Bologna.

GUIENNE (anc. *Aquitania*), an ancient province in the S. W. of France, a part of the old kingdom of Aquitaine, bounded N. by Saintonge, Angoumois, Limousin, and Auvergne, E. by Languedoc, S. by Languedoc and Gascony, and W. by the bay of Biscay. This appellation, supposed to be a corruption of Aquitaine, appeared for the first time during the 13th century. The duchy of Guienne was given up to the king of England by the treaty of Bretigny in 1360, and was held by him almost without interruption until 1452, when it was reconquered by the army of Charles VII., under Dunois. Out of the territory of Guienne the departments of Gironde, Lot, Lot-et-Garonne, Dordogne, Aveyron, and part of those of Landes and Tarn-et-Garonne, have been formed.

GUIGNES, JOSEPH DE, a French orientalist, born in Pontoise, Oct. 19, 1721, died in Paris, March 22, 1800. He was so well versed in the oriental languages, the Chinese especially, that, though scarcely 20 years old, on the death of his teacher Fourmont he was appointed secretary-interpreter to the king. In 1752 the royal society of London elected him a member, and two years later the French academy of inscriptions did the same. His *Histoire générale des Huns, Turcs, Mogols et autres Tartares occidentaux, avant et depuis J. C. jusqu'à présent* (5 vols. 4to., 1756-'8) is the solid foundation of his fame. He afterward wrote several essays and papers, which appeared either in book form or in scientific collections; among the number is a curious *mémoire* in which he contends that the Chinese are but an Egyptian colony. De Guignes was also the editor of Father Amiot's translation of the *Chou King*, one of the sacred books of China.—His son, CHRISTIAN LOUIS JOSEPH, born in Paris, Aug. 25, 1758, died March 9, 1845, was for 17 years French resident and consul at Canton, published, beside several

other papers, his *Voyages à Péking, Manille et l'Île de France*, and edited under his own name in 1818 a *Dictionnaire Chinois, Français et Latin*, which was merely an adaptation of the *Han-tsé-ty-y* of Basile de Glemona. This plagiarism was denounced in 1819.

GUIJA, or GULJAR, a large lake in the republic of San Salvador, 20 leagues in circumference, and of great depth. It receives several considerable streams, and discharges itself through the Lempa, which is the largest river flowing into the Pacific in all Central America. On the islands in this lake the aborigines had temples of great sanctity, the ruins of which still exist. The country around is volcanic.

GUILD (Sax. *gildan*, to pay), a society of tradesmen or artificers incorporated for the purposes of their craft. Each member contributes toward the expenses, whence the appellation. Among the Romans, at one period, various mechanical fraternities existed, which bore a resemblance to modern guilds in the fact that they were permitted to regulate their corporate affairs by their own laws. Some authorities have attributed the origin of guilds on the continent of Europe to the imitation of these fraternities, but apparently without reason. In England, according to some, they may be traced to the Saxon law which ordained that every freeman over the age of 14 should find security for his good behavior. To meet this requirement families formed themselves into associations of ten. Others find the origin of guilds in the proposals of Saxon boroughs, after the Norman conquest, themselves to collect the taxes imposed on them, rather than be subject to the exactions of the Norman bailiffs. Guilds were in operation long before they were formally licensed. Early charters of boroughs are usually addressed to the "burgesses," or town's men, whom Madox defines to be "men who had a settled dwelling in the town, who merchandised there, and who were of the *hans* or guild." Guilds introduced the democratic element into society, and in their progress became the bulwarks of the citizen's liberty, and the depositaries of much political power. They probably first attained their development in the free cities of Italy, where the traders had to protect themselves against the rapacity of the lords. By the close of the 12th century merchants' guilds were general throughout the cities of Europe. The drapers' company of Hamburg dates from 1158, and that of the shoemakers of Magdeburg from 1157. Similar associations existed in Milan about the same date. They were common in France in the reign of Louis IX. With the increase of their wealth and strength the guilds either purchased or extorted from their rulers privileges which, once obtained, they were careful never to give up. By the 18th century they became possessed of considerable influence, and in the two succeeding ages were the counterbalance against the power of the nobles. By degrees they themselves grew into intolerable aristocracies, especially in Germany, where their

exactions had to be curbed by laws of the empire. Guilds (*Innungen* or *Zünfte*) were abolished in Prussia in 1810, but the want of similar associations has since been felt, and laws were enacted in 1840 to favor their reestablishment, without interfering however with private enterprise. In France they were suppressed in 1776, but soon reestablished, and not finally abolished until 1791. The term is in use in Russia to signify the classes of business, which enjoy different privileges according to the amount of taxes imposed upon them, as for instance, a merchant of the 8d guild. In London the guilds or companies have an importance on account of their freemen possessing municipal votes. For this reason many persons not tradesmen become members. Freedom of companies is sometimes conferred as a compliment. The English companies regulate their affairs by their own laws, but have no power to prevent qualified persons from becoming members, nor to interdict from trading. London Guildhall, founded in 1411, is the hall of the "companies." In Scotland the companies of merchant freemen, in every royal borough, are called the guilds or guildry, and the magistrate next in rank to the mayor (provost) is called the dean of guild. Guild does not necessarily mean a trade association. Charles Dickens and other literary men in England recently undertook to establish a guild of literature and art, but without success.

GUILDER, a Dutch silver coin, whose value is a little more than 40 cents.

GUILDFORD, a municipal and parliamentary borough, market town, and the capital of Surrey, Eng., on the right bank of the Wey, 29 m. S.W. from London, at the junction of a branch of the south-western with the Guildford and Reigate railway; pop. in 1851, 6,740. The town stands on a declivity sloping toward the river, which is here crossed by a handsome bridge. It is well lighted, neatly and substantially built, supplied with water, and adorned by several fine edifices. There are 8 parish churches, 2 of which are very ancient and rudely constructed of chalk with an admixture of flint, stone, &c., a hospital, a theatre, extensive barracks, several schools, and the Guildford institute, with a museum, library, lecture hall, and reading room. Four weekly newspapers are published in the town. The chief manufactures are paper, powder, bricks, coaches, iron, and malt liquors; the trade is mostly in timber, grain, malt, live stock, &c. There is some commerce with London, but the retail traffic is the main support of the town. A queen's plate of 100 guineas is annually run for on a race course in the neighborhood. In 1036, under the reign of Harold I., Alfred, son of Ethelred II., after landing in Kent with the design of recovering the kingdom, and advancing thus far into the country, was induced to enter Guildford, where he was made prisoner in the night, and his Norman attendants massacred to the number of nearly 600.

GUILDFORD, a N. W. co. of N. Carolina, drained by Deep river, a branch of the Cape

Fear, and by Reedy fork of Haws river; area, 600 sq. m.; pop. in 1850, 19,754, of whom 3,186 were slaves. The surface is undulating and abundantly timbered; the soil is fertile, well watered, and highly cultivated. The productions in 1850 were 121,379 bushels of wheat, 214,682 of oats, 884,286 of Indian corn, and 600 bales of cotton. There were 13 grist mills, 8 saw mills, 8 woollen factories, 2 newspaper offices, 40 churches, and 3,927 pupils attending public schools. The county contains a copper mine, and is intersected by the central railroad of North Carolina. Within its limits occurred the battle of Guilford Court House in 1781. Organized in 1770, and named in honor of the earl of Guilford. Capital, Greensborough.

GUILFORD, a post borough of New Haven co., Conn., on the New Haven and New London railroad, near Long Island sound, 16 m. E. from New Haven; pop. in 1850, 2,653. The town has an antiquated appearance, but contains one or two handsome buildings, the chief of which is a stone structure recently erected for a high school. In the centre of the village is a public square, on which front the hotel, the principal stores, and 4 churches, 1 Baptist, 1 Congregational, and 1 Methodist. There are few manufactures, the inhabitants being engaged chiefly in farming and maritime pursuits. The harbor is visited by fishing and coasting vessels. About 1 m. S. of the village is the Point, a favorite watering and bathing place. The first settlement in the town was made by a party of English nonconformists in 1639, and the residence of their leader, the Rev. Henry Whitfield, is still standing.

GUILFORD COURT HOUSE, a locality about 5 m. from Greensborough, Guilford co., N. C., memorable for a battle fought, March 15, 1781, between the Americans under Gen. Greene and the British under Lord Cornwallis. The American force numbered 4,243 foot and 161 horse, about 1,500 being regular troops, and the rest mainly raw militia. The British were about 2,400 strong, and consisted chiefly of veteran soldiers. Greene had chosen a strong position on the declivity of a hill, and drew up his army in 3 lines; the first, composed of North Carolina militia under Gens. Butler and Eaton, was posted across the road by which the British were expected to advance; the second, of Virginia militia, led by Stevens and Lawson, formed in the midst of a wood 800 yards in the rear of the first; and the third, consisting of continentals under Huger and Williams, was stationed at the top of the hill near the court house. While these preparations were in progress, Lieut. Col. Lee sustained an engagement with the van of the royal army under Lieut. Col. Tarleton, and retired after inflicting a heavy loss. The battle began shortly after 1 o'clock with a brisk cannonade on both sides, during which the British formed in a single line under cover of the smoke, and at once advanced upon the North Carolina militia, who after a discharge of musketry threw away their arms,

knapsacks, and canteens, and fled through the woods without waiting for the shock. The Virginians of the second line, however, poured a galling fire upon the advancing troops; but their right finally retreated before the bayonet and fell back to the court house, and the left, after a brave resistance, was forced to follow their example. The whole British infantry was now engaged, while the flower of the American army was still in reserve. Greene rode along the line, encouraging his troops, and already sanguine of victory. The British pressed forward to the third line, but the first regiment of Maryland continentals received them with a well directed fire, and before they recovered from the shock routed them with the bayonet. The second regiment of Marylanders, however, fled at the first onset, leaving 2 field pieces in the hands of the enemy; but the pursuers, consisting of a battalion of the guards under Lieut. Col. Stuart, were repulsed by the victorious first regiment, and driven back in confusion by Lieut. Cols. Howard and Washington. To check the pursuit, Cornwallis ordered his artillery to play upon the Americans. The expedient was successful, but he was forced to fire full in the face of his retreating guards, and only half the battalion was extricated. The British line was now formed anew, and Gen. Greene, convinced by the flight of his militiamen and the Maryland continentals that a fresh conflict would result in the annihilation of his army, ordered a retreat. The British obtained their victory by the loss of over 600 men, including many officers. The American loss was 1,128 killed, wounded, and missing. The result, however, was what Greene had hoped for. Cornwallis was so much crippled that he retreated on the 18th with the Americans in hot pursuit; and Mr. Fox is said to have exclaimed when the battle was mentioned in the British house of commons, that "another such victory would ruin the British army."

GUILLEMOT, an arctic web-footed bird, of the family *alcidae*, and sub-family *urinae*, including the genera *uria* (Möhring), *brachyrhamphus* (Brandt), and *mergulus* (Ray). The last, to which the little guillemot belongs, has been described under *Aux*. The genus *uria* is characterized by a moderate head; rather long, straight, and pointed bill, with a distinct angle on the under mandible; wings short and pointed, with the 1st quill longest; tail very short; tarsi shorter than middle toe; legs short and robust; toes rather long, fully webbed; claws strong and curved; hind toe wanting. The general form is short and robust, the size never large, and the prevailing colors black and white. There are about 7 species, inhabiting the arctic seas between America and Asia, migrating to temperate regions during winter. The flight is rapid, with short flaps, near the surface of the water; they are excellent swimmers and divers, but poor walkers from the shortness and posterior position of their legs; they feed on fish and other products of the sea; they deposit usually

a single egg, of large size, on rocks overhanging the water, breeding in large companies. The black guillemot (*U. grylle*, Linn.) is 14 inches long, and 22 inches in extent of wings; the general color in summer is black tinged with green; a large transverse oval spot on the wing, under wing coverts, and axillaries, white; bill black, and feet red; in winter and in the young plumage, the under parts, neck, and rump are white, the head above and back dark brown. This species is found breeding, about June, from the arctic regions to the bay of Fundy; according to Audubon, it lays 8 eggs, in a nest composed of pebbles; the eggs are about  $2\frac{1}{4}$  by  $1\frac{1}{4}$  inches, of an earthy white color, blotched with dark purplish black toward the larger end; they are delicate and nutritious articles of food, and even the black and tough flesh has proved palatable to many an arctic voyager. There is a species on the N. W. coast (*U. columba*, Pall.), resembling the preceding, except that the white of the wing is divided by a diagonal band of brownish black. The foolish guillemot (*U. troile*, Linn.) is about 17 inches long, and 30 in extent of wings; the general color above is grayish black, tinged with dark brown on the sides of the head and neck; a bar on the wings, and a line encircling and behind the eye, white; under parts white; feet greenish black. It is occasionally found as far south as New York, but breeds in such numbers on the coast of Labrador that the air is darkened by their multitudes; the female lays a single egg, of large size, white with dark blotches, on the bare rock, and, like the other species, plucks feathers from the abdomen over a space large enough to cover the egg; both sexes assist in incubation. The plumage is exceedingly dense, and so admirably adapted for a creature exposed to severe cold that "as warm as a murre" (one of the common names of this bird) has become a proverb; the flesh is tough, and eaten only by hungry seamen; the eggs are highly esteemed as food. They are rapid fliers, and such bold swimmers and divers as to defy the highest waves. The thick-billed guillemot (*U. arctica*, Pall.) is as large as the last, with similar colored plumage, but with a shorter and wider bill; it is not uncommon during the winter on the coast of the middle and northern states. The guillemots are called stupid and foolish, because they allow man to invade their retreats and knock them down with clubs, without any attempt to escape; this apparent apathy is owing to the structure of the bird, which is ill calculated for progression on land, but admirably adapted for a life on the water, on whose surface they are a match for man with all his cunning. The above species are found also on the northern shores of Europe.—The genus *brachyrhamphus* includes the smaller guillemots, with a larger head, shorter bill densely covered with feathers at the base, curved upper mandible, and in other respects as in the preceding genus. The marbled guillemot (*B. marmoratus*, Gmel.) is about 10 inches long, brownish black

above, tinged with ashy on the back, with 2 white spots on each side of the back; ring round hind neck, and under parts, white, bill black, and feet yellow; the young have the upper feathers with reddish edges, and the under parts spotted and marbled with brownish black and white. The gray-headed or ancient guillemot (*B. antiquus*, Gmel.) is a little larger, with white stripes on each side of the head and black throat. These and several others inhabit the north Pacific, and are most abundant about the N. W. coast of America. The name of guillemot is given to the horn-billed auk (*cerorhina monocerata*, Pall.) of N. W. America. The habits of all the guillemots are the same; their numbers, beauty, activity, and useful properties have been the admiration of all arctic voyagers, many of whom have been saved from the peril of starvation by their eggs and flesh, which are often the only accessible food in those dreary wastes.

GUILLEMINOT, ARMAND CHARLES, count, a French general and diplomatist, born in Dunkirk, May 2, 1774, died in Baden, March 14, 1840. When scarcely 15 years old he took part in the insurrection of Brabant against Austria, and then, returning to France, served under Dumouriez, Pichegru, and Moreau. His known friendship for the last two generals caused his dismissal from the army on the discovery of the conspiracy in which they were implicated; but his experience as a topographical engineer was so highly valued that he was reinstated in 1805. In 1808 he was employed in Spain, and made a brigadier-general. In 1812 he was attached to the staff of the grand army that invaded Russia, fought at Borodino, and during the retreat from Moscow was the head staff officer of Eugène Beauharnais. His promotion to the rank of general of division took place March 23, 1813, and he participated in some of the last battles of Napoleon. He was among the first to adhere to the Bourbons, and was faithful to them during the Hundred Days. After the battle of Waterloo, he was one of the commissioners who negotiated for the capitulation of Paris, and signed the truce of July 3, 1815. In 1828 he submitted a plan for the invasion of Spain, was appointed major-general under the duke of Angoulême, and successfully led the French troops through the peninsula. He was made a peer, Oct. 9, 1828, and sent as ambassador to Constantinople, where he remained 7 years. On his recall to France he retired to private life.

GUILIM, JOHN, an English writer on heraldry, born in Herefordshire about 1565, died in London, May 7, 1621. He was educated at Oxford, subsequently became a member of the society of the college of arms in London, and in 1617 was appointed rouge-croix pursuivant of arms. His reputation rests upon the work entitled "The Display of Heraldry," first published in 1610, and which has gone through many editions; that of 1724, containing in addition "A Treatise of Honor, Civil and Military,

by Captain John Logan," is considered the best. Guillim's claim to the entire authorship of the work, however, is not well authenticated, John Barkham, it is said, having prepared the greater part of it, and allowed him to publish it under his own name.

GUILLOTIN, JOSEPH IGNAZ, a French physician, born in Saintes, May 28, 1738, died in Paris, March 26, 1814. He studied under Antoine Petit, was graduated doctor in medicine in 1770, and established himself in the capital, where by his liberal and philanthropic opinions, no less than his talent and kindness, he quickly became popular. He was elected one of the deputies of Paris to the constituent assembly, and gave special attention to measures connected with his own profession. Anxious to alleviate the horrors of capital punishment, he proposed, Oct. 10, 1789, to abolish the usual mode of decapitation and adopt machinery which would dispense with the axe or sword. This motion was postponed until the penal code should come under consideration. Meanwhile, on Dec. 1 of the same year, Guillotin caused a resolution to be adopted to the effect that no discrimination should be made in penal sentences in favor of persons of quality. In 1791, Guillotin's motion of Oct. 10, 1789, was renewed in a somewhat altered form by Lepelletier de St. Fargeau; and on March 20, 1792, the legislative assembly, on a report presented by Dr. Antoine Louis, the perpetual secretary of the academy of surgery, adopted a resolution ordering a machine for decapitation described by the same to be adopted. This machine, in the invention and construction of which Guillotin had no share whatever, received at first the name of *Louison* or *Louissette*, which was soon superseded by that of *Guillotiné*, first used in a satirical song published in the royalist newspaper *Les actes des apôtres*. Guillotin, who had been put in prison during the reign of terror, was released on the death of Robespierre, and resumed the practice of his profession.

GUILLOTINE, an instrument for inflicting capital punishment by decapitation. It consists of an oblique-edged knife, heavily weighted, sliding easily between 2 upright grooved posts, and descending on a block where the head of the sufferer rests. This machine, which was adopted toward the beginning of the French revolution, is not altogether a modern invention. Similar contrivances were in use in several parts of Europe during the 16th and 17th centuries, if not before. According to Crusius, in his *Annales Suevici* (1594), such an instrument of decapitation existed in early times in Germany, but was superseded by the sword; it was styled *Falbeil*, falling hatchet, or *Planke der Döll*, plank of wood. A representation of it may be seen in two old engravings, the one by George Penez, who died in 1550, the other by Henry Aldigrover, bearing the date of 1558; and also in an old picture which, according to Reiffenberg, is still preserved in the city hall of Augsburg. Jean d'Anton, the historiographer of Louis XII. of

France, narrating an execution which he witnessed at Genoa, May 13, 1507, describes a machine exactly like the guillotine. In Achille Bochi's *Symbolica Questiones de Universo Genere* (1555), there is an engraving representing the execution of a Spartan by such an apparatus. This is the *mannai*, which was used in all parts of Italy for the execution of men of rank, and is fully described by Father Labat in his *Voyage en Italie* in 1780. The same had been introduced into southern France, and Puységur in his *Mémoires* makes an allusion to it on occasion of the execution of Montmorency in 1632. A similar contrivance existed in the Netherlands, as appears from a chapter in the *Dootkiste* (the "Coffin") of Jacob Catta. The "maiden" of Scotland, which was used in the decapitation of the regent Morton in 1581, and is still preserved in the museum of the antiquarian society at Edinburgh, was an instrument akin to those above mentioned, and either it or at least the pattern of it had been brought from abroad by the very man who suffered by it. The decapitating machine therefore was far from being a novelty, when Dr. Guillotin (see the preceding article), moved by philanthropic motives, suggested its application in 1789; but it was known only to a few learned men. Dr. Antoine Louis, in a report presented to the legislative assembly in 1792, explained the principles according to which such a machine should be constructed. The scheme being submitted to the carpenter employed by the government, he demanded 5,000 francs for making the instrument; but a young German mechanic named Schmidt, who had recently arrived in Paris, offered to build it for a much smaller sum; and finally a bargain was struck at 500 francs, Schmidt contracting to furnish 88 machines of the same kind, one for each department. The machine was first tried, April 18, 1792, upon 8 corpses at the Bicêtre hospital, and worked so satisfactorily that 7 days later it was used publicly for the decapitation of Pelletier, a highwayman who had been sentenced to death 8 months before. Sömmering, in the *Moniteur* of Nov. 9, 1795, denounced it as too rapid in its operation, and maintained that sensation does not cease immediately after the head of the sufferer has been severed from the body. The controversy was kept up by Sue, Oelsner, Cabanis, and others. In the same year appeared Sédillot's *Réflexions historiques et philosophiques sur le supplice de la guillotine*, and in 1796 the *Anecdotes sur les décapités*. The question has been renewed at different times and in various forms, particularly in an article in the London "Quarterly Review" for Dec. 1846, republished separately in 1850; Louis Dubois' *Recherches historiques et physiologiques sur la guillotine* (Paris, 1848); Ludovic Lalanne's *Curiosités des traditions, des mœurs et des légendes* (Paris, 1847).—The guillotine is used in the German territories on the left bank of the Rhine, which formerly belonged to France, and where the *Codes Napoléon* still prevails. An instrument

very much like the guillotine (*Fallschwert*) was adopted in Saxony and Würtemberg in 1853, and in Bavaria in 1854.

GUINAND, M., a Swiss optician, born in the canton of Neuchâtel about 1745, died in 1825. He was the son of a house carpenter, and first evinced the direction of his tastes and his remarkable mechanical genius by constructing a telescope, in imitation of one of great value in the possession of his employer, so like the model that it was difficult to decide which of the two was the better instrument. At 40 years of age he commenced the manufacture of lenses for telescopes, which were held in great estimation all over Europe. Some of these coming under the observation of Fraunhofer, the well known instrument maker in Bavaria, he engaged the services of Guinand for a number of years, solely for his skill in this manufacture. In the latter part of his life Guinand was occupied in constructing telescopes of great size and power, every part of which was the work of his own hands. (See GLASS, and LENS.)

GUINEA, an English gold coin, first struck in the reign of Charles II. (1664) of gold which had been brought from the coast of Guinea, whence its name. Its value is 21 shillings, or about \$5.06. Guinea has not been coined since 1817, when they were superseded by the sovereign, and have now become rare.

GUINEA, a name applied to an undefined portion of the W. coast of Africa. According to some English geographers, it stretches from the mouth of the Gambia to Cape Negro, all that part N. of Cape Lopez being called Upper or North Guinea, and the remainder Lower or South Guinea. The Dutch bound it N. by Cape Blanco and S. by Cape Lopez, and on French maps it is generally described as lying between Capes Mount and Lopez.—Adopting the English definition, UPPER GUINEA extends from lat. 18° 28' N. to 0° 45' S., and is bounded N. by Senegambia and Soodan, E. by Soodan, Fumina, and the unexplored regions of the central part of South Africa, S. by Lower Guinea and the gulf of Guinea, and W. by the gulf of Guinea and the Atlantic. It extends but a comparatively short distance inland, its average breadth being probably not more than 200 or 300 m., while its coast line exceeds 2,500. It comprises the greater part of Senegambia, the district of Sierra Leone, the Malaghetta, Pepper, or Grain coast (including the republic of Liberia), the Ivory coast, the Gold coast (including Ashantee), the Slave coast (including Dahomey), Benin, Qua-land, Biafra, Old Calabar, Yorriba, &c. The principal rivers are the Gambia, Jéba, Nunez, Dulinka, St. Paul's, Cavalla, Volta, Quorra or Joliba (the ancient Niger), Old Calabar, Cameroon's, Qua-qua, and Gaboon. The surface is richly diversified. A lofty range called the Kong mountains extends along the N. frontier. The coasts in some places are high and rocky, in others low and flat. A portion of the seaboard is sterile, and the soil is of very variable quality; but further inland the country



is susceptible of the highest cultivation, and fertilized by frequent inundations of the winding streams. The climate is not so hot as that of many other portions of Africa nearer the tropics. At Cape Coast Castle, which is considered the hottest situation on the Gold coast, the mean temperature during the hottest months is from 85° to 90°. There are 3 seasons, 2 wet and one dry. Tornadoes are common at certain periods, and the months of December, January, and February are marked by the prevalence of the wind called the harmattan. The most valuable minerals are gold and iron, which are usually found in granitic or schistose rocks; gold is also obtained in the beds of some of the rivers. The interior is rich in virgin mines of this latter mineral, which the natives lack sufficient skill to work. The forests, which cover a large proportion of the surface, abound in magnificent trees, among which are the baobab, palm, and cocoa. Oranges, lemons, grapes, pepper, sugar cane, cotton, indigo, tobacco, maize, millet, rice, yams, potatoes, various gums and dye woods, and ginger, are among the other vegetable productions. The animals are cattle, of tough and ill-flavored flesh, sheep, horses, and goats (all of which are of poor breeds), elephants, buffaloes, jackals, tiger cats, hyenas, leopards, deer, hares, porcupines, sloths, monkeys, lizards, rats, and mice. Cats and dogs have been introduced from Europe. The latter speedily degenerate, but are esteemed by the natives for their flesh. Pheasants, partridges, snipes, turtle doves, birds of beautiful plumage, serpents, scorpions, centipedes, toads, frogs, locusts, and crocodiles are numerous, and the coasts abound with excellent fish, beside furnishing coral and ambergris. The inhabitants are divided into a great many tribes of from 2,000 to 80,000 souls each. Some of these have become consolidated into nations, the most powerful of which are those of Ashantee, Dahomey, and Benin. The tribes differ considerably in disposition and morals, but resemble each other in physical characteristics and customs. They are good types of the pure negro race, having thick lips, flat noses, and well developed persons. Polygamy is universal, and fetichism is the prevailing religion. The commerce of Guinea with Europeans is carried on wholly along the coast, no successful attempt having been made to open the interior. The most important articles of barter are bar wood, cam wood, teak, ebony, ginger, pepper, gums, rice, palm oil, ivory, wax, and gold, in exchange for lead, iron, fire-arms, gunpowder, cotton and woollen manufactures, brass vessels, salt, spirits, tobacco pipes, and beads. The slave trade was once, the most flourishing branch of commerce, and war for the sake of procuring captives to sell to the whites was the chief occupation of some of the tribes. Palm oil, ivory, and gold dust are now the great staples of export. The principal European settlements are Bissao, Liverpool, Freetown, Dixcove, Cape Coast Castle, Anamboo, and Accra, belonging to the British; Great Bassam and Assinie to the French;

and Axem and Elmina to the Dutch. Liberia is a negro republic founded by the American colonization society.—**LOWER GUINEA** extends from lat. 0° 45' to 15° 45' S., and is bounded N. by Upper Guinea, E. and S. by unexplored territory, and W. by the Atlantic. It comprises the countries of Loango, Congo, Angola, and Benguela, and has a coast line of about 1,500 m. It has no fixed boundary on the E., but its average breadth may be set down as about equal to that of Upper Guinea. The coasts are generally low and regular, but the interior is traversed N. and S. by a range of mountains to which the Portuguese have given the name of Crystal or Salt mountains. These mountains are said to contain copper and iron, and are covered with forests. The principal rivers are the Killoo, Congo or Zaire, Rengo, Coanza, Ambriz, Liñabe, Sumba, and Queninga. Vegetation is luxuriant, and the productions are similar to those of Upper Guinea. The S. districts are nominally in the possession of the Portuguese, who discovered this part of the coast in 1487. Their capital is St. Paul de Loanda.

**GUINEA, GULF OF**, that portion of the Atlantic which washes the shores of Upper Guinea between Capes Palmas and Lopez, including the bights of Biafra and Benin. It receives the rivers Volta, Quorra, Old Calabar, Quaqua, and Gaboon, contains the islands of St. Thomas, Fernando Po, and Prince's island, and has 2 currents, one setting eastward into the bights of Benin and Biafra, and the other coming from the S.; they meet in the bight of Biafra, and unite in one gradually expanding stream which flows from that point N. W., W., and S. W.

**GUINEA FOWL**, or **PINTADO**, a gallinaceous bird, of the turkey family, and genus *numida* (Linn.), characterized by a moderate bill, with arched culmen and upper mandible overhanging the lower, and lateral margins smooth and curved; nostrils large, oval, and partly covered by a membrane; wings moderate, with the 5th quill longest; tail short and pendant; tarsi longer than middle toe, without spurs, covered in front with broad divided scales; toes moderate, the anterior united at their base by a membrane, the hind toe short and elevated; claws short and very slightly curved. There are 5 species described by Gray, all of which have the head more or less naked, with fleshy caruncles below the bill, and some with a callos crest; the neck is long and slender, the body stout, and the feathers of the rump with an inflated appearance. They are peculiar to Africa, where they frequent woods on the banks of rivers in flocks of 200 or 300, scattering in search of food, which consists of grains, grasshoppers, ants, and other insects; when alarmed, they attempt to escape by running rather than flight; the eggs are numerous, and laid in a slight nest in a bush or thicket. The common Guinea or pea fowl (*N. meleagris*, Linn.) is slate-colored, covered all over with rounded white spots, and is about the size of the domestic cock. It was well known to the ancients,

by whom it was domesticated for the sake of its flesh, and who named it *meleagris* from the tradition that it was the result of the metamorphosis of the sisters of Meleager, the spots on the plumage being the traces of the tears shed at the death of their brother. Guinea fowls are very noisy and troublesome birds, always quarrelling with the other inmates of the poultry yard; they are hard to raise, from the delicacy of the young and their liability to disease; their flesh is of fine flavor, and their eggs are excellent. They are not profitable to the farmer, are great eaters, requiring to be fed beyond what they can pick up by themselves, and are apt to injure tender buds and flowers. One male suffices for 10 females; they lay in May or June 16 to 24 eggs, with a hard shell, of a yellowish white color with small brown points; they are poor sitters and not very tender mothers; incubation lasts 8 weeks, and is best performed by the common hen. The crested pintado (*N. cristata*, Pall.) has a crest of black feathers, and the body black with blue spots; the mitred pintado (*N. mitrata*, Pall.) has the head surmounted by a conical helmet, and is black, white spotted. Both these species have the same habits as the first, and could be as easily domesticated; but the excellence of their flesh will hardly cause any of them to be extensively raised, unless they can be kept separate from other poultry, on account of their tyrannical disposition, strength, and courage.

GUINEA PIG, a South American rodent, of the sub-family *caviina*, and genus *cavia* (Klein). It will be seen that the common name conveys two erroneous impressions, as the animal is not found in Guinea, nor is it a pig; the term Guinea is doubtless a corruption of Guiana, and the name pig derived from the grunting noise made by it when hungry. The wild Guinea pig, or restless cavy (*C. aperea*, Linn.), is about 10 inches long, with a thick heavy body; short, wide, erect, and transparent ears; large prominent eyes; head and snout like those of a rabbit, with white incisors; short neck and legs; 4 toes before, and 3 behind, unconnected by any membrane; and a long, rather coarse fur. The colors are black and dirty yellow above and on the sides in distinct pencils, the former prevailing on the back and upper surface of the head, the general tint being a dark grayish brown; the throat and abdomen dirty yellow. The characters in the sub-family have been given in the article CAVY. The distinguishing characters from the sub-genus *cerodon* are the larger size of the hind lobes of the molars, these lobes in the upper teeth having an indenting fold of enamel on the outer side, and the corresponding half of the lower with its deep fold on the inner side. It is found from about lat. 85° S. through Paraguay, Bolivia, Brazil, and perhaps as far N. as Guiana. Its food is entirely vegetable, and its time of feeding toward evening, or in the morning on cloudy days; it prefers marshy places covered with aquatic plants, though it is also found in thickets and hedges, and even sand hillocks

on the banks of rivers; it generally lives in societies of from 6 to 15 individuals, and its presence may often be detected by the beaten paths among the plants; it breeds only once a year, and has one or two young at a birth. The restless cavy is generally believed to be the animal from which the domestic Guinea pig (*C. cobaya*) originated; if this be true, it shows very remarkable modifications of animal habits by domestication. Dr. Rengger denies this origin, from the marked differences in the skull and teeth, the inability of the *cobaya* to bear cold and moisture, the breeding of the latter several times a year with many young at each birth, the difficulty of pairing the tamed *C. aperea* with the *C. cobaya*, and the fact that confinement for several generations has no tendency to change the colors of the former. It is known from the drawings of Aldrovandus, according to F. Cuvier, that the domestic animal had its distinguishing colors of black, white, and fulvous yellow, as we see it now, within half a century after the discovery of South America, whence the latter concludes that it was tamed by the indigenous races; but Mr. Waterhouse thinks it more probable that a pretty variety, such as may occur in all wild animals, attracted the attention of Europeans, who captured and domesticated it for its harmless disposition as well as its beauty, and by care perpetuated the race of the common Guinea pig. Whether thus derived or not, the animal is universally known by its black, white, and fulvous patches, irregularly distributed, and its short, close, and shining hair. It is exceedingly gentle in disposition, never attempting to defend itself by teeth or nails, simply making very slight efforts to escape, and uttering a sharp cry; it is so weak, inoffensive, and apparently so insensible to every thing about it, that it has been described as an "automaton endued with fecundity, and created only to represent a species." Its remarkable fecundity alone preserves it from extinction; it is capable of fecundation at the age of 6 or 8 weeks, and brings forth after 8 weeks' gestation from 4 to 12 at a birth, according to the age of the mother, who reaches her full development in 9 months; lactation lasts about 15 days, and the female is ready for another fecundation; the young are born covered with fur, and with the eyes open. They are very sensitive to cold and damp, as is known by their huddling together to keep warm; the flesh is not eaten, and the skin is useless, the only reasons for keeping them being their gentleness and beauty; there is a popular belief that their odor drives away rats. Their food is entirely vegetable, and they drink but seldom and by lapping; they will eat the usual green food of rabbits, but prefer parsley and carrot tops to the bread, milk, and meal upon which they are generally fed; they are fond of apples and other fruits, and remarkably so of tea leaves. Though cleanly in their habits, they have a disagreeable odor; like hares, they sleep with their eyes half open. They are usually kept in a house having

a back sleeping chamber and a front feeding room, in which, protected from cold, they may pass their quiet life of eating, sleeping, and reproducing their kind. Scarcely any two animals can be found with the same markings; the dark tortoise-shell ones are the most highly prized.

**GUINEA WORM.** See *ENTOZOA*, genus *filaria*.

**GUIPUZCOA**, one of the 4 Basque provinces of Spain, bounded N. by the bay of Biscay, N. E. by France, E. and S. E. by Navarre, S. and S. W. by Alava, and W. by Biscay; area, 621 sq. m.; pop. in 1857, 164,991. The coast is indented with numerous harbors. The principal rivers, all of which are small, are the Deva, Urola, Oria, Urumea, Lezo, and Bidasoa. The surface is an alternation of mountain, hill, and valley, and the scenery is highly romantic and picturesque. The climate, though humid, is mild, agreeable, and healthful; but thunder storms are frequent in winter. The soil of the valley is fertile and well cultivated. From the mountainous nature of the country, however, agricultural labors are prosecuted with difficulty. The great sources of wealth are mines and fisheries. The chief minerals are iron, argentiferous lead, copper, marble, and gypsum. The principal manufactures are of iron. The inhabitants are a fine, manly race, honest, industrious, and brave. They are fond of athletic exercises, and delight much in dancing and bull-fighting. The chief towns are Tolosa, the capital, San Sebastian, and Fuenterrabia. La Isla de los Faisanes in the Bidasoa is celebrated as the place where the peace of the Pyrénées was concluded in 1659 between France and Spain.

**GUISCARD, ROBERT**, a Norman adventurer, the founder of the kingdom of Naples, born about 1015, died July 17, 1085. His father, Tancred de Hauteville, a petty Norman baron, had 12 sons, all trained to arms, of whom Robert was the 6th. As the paternal estate was insufficient to support so large a family, the 3 eldest sons went to Italy, where they secured rich possessions in the Norman colony of Apulia, of which they eventually became the leading nobles. Attracted by their success, the younger brothers in turn repaired to Italy, and Robert, who was surnamed Guiscard, the prudent or adroit, showed so much valor and address that on the death of his brother Humphrey in 1057 he was proclaimed count of Apulia, to the exclusion of the young son of the latter. He soon after overran Calabria, and received from Pope Nicholas II. the title of duke of both provinces, with the additional grant of whatever portions of Italy or Sicily he could wrest from the Greek schismatics or the Saracens. With the aid of his younger brother Roger he conquered Sicily, and chiefly by his own efforts ejected the Saracens from their remaining possessions in southern Italy. The present kingdom of Naples had its origin in these conquests, and from this period dates the annual homage paid by the

Neapolitan sovereigns to the holy see. Robert, having subsequently undertaken to annex the duchy of Benevento to his dominions, was brought into collision with Pope Gregory VII., who claimed the territory as a grant from the emperor of Germany. The pope excommunicated him in 1075, but a reconciliation was soon effected, and Robert bound himself to defend the rights of the church under all contingencies. In 1081, under the pretext of sustaining the rights of Constantine, son of the dethroned emperor Michael VII., who had married his daughter, but in reality with a view to more extended conquests, he invaded Epirus and other provinces of the Byzantine empire, and after a series of victories was in full march for Constantinople, when he was recalled to Italy to relieve the pope, who was besieged by the emperor Henry IV. in the castle of St. Angelo. At Guiscard's approach Henry drew off his forces; but the populace having refused to receive the Normans otherwise than as enemies, the city was sacked by them, and a large portion of it burned. The pope, fearing to remain in Rome, followed his liberator to Salerno, where he died soon after. Guiscard immediately resumed his ambitious designs against Constantinople, and sailed with a large fleet for the Grecian archipelago. He died of an epidemic disease at Cephalonia on the eve of his departure for Constantinople. He was remarkable for strength and beauty of person, and his military and legislative qualities were worthy the founder of a great kingdom.

**GUISCARD, or GUISCARDT, KARL GOTTLIEB**, better known under the name of *QUINTUS ILLIUS*, a German writer on military tactics, born in Magdeburg in 1724, died in Berlin, May 15, 1775. He belonged to a French Protestant family, and studied at the universities of Halle, Marburg, and Leyden, with the intention of becoming a minister; but suddenly changing his mind, he entered the military service of Holland. After a single campaign, in which he served as ensign in an infantry regiment, peace having been restored by the treaty of Aix la Chapelle, he devoted his leisure hours to research upon military art in ancient times, and published in 1758 at the Hague his *Mémoires militaires sur les Grecs et les Romains*. This work attracted the attention of Frederic the Great, who summoned the author to Breslau and gave him a major's commission. In this capacity Guiscard was called into service in Saxony, but signalized himself more by extortions and dishonesty than by valor. The king nevertheless promoted him to a colonelcy in 1763, and continued to treat him with some favor. In 1773 he published at Berlin his *Mémoires historiques et critiques sur plusieurs points d'art militaire*, which he dedicated to Frederic. This work is written with clearness and a thorough knowledge of the subject, and was highly praised by Gibbon. On his death, the king purchased his library for about \$6,000.

GUISE, House of, a younger branch of the ducal family of Lorraine, which, having established itself in France under the reign of Francis I., played a conspicuous part in the religious and civil wars of the 16th century. Its most celebrated members were the following: FRANÇOIS of Lorraine, 3d duke of Guise, born at the castle of Bar, Feb. 17, 1519, killed Feb. 24, 1568, was one of the greatest generals of his time. Almost from the outset of his career he was distinguished as a good general and a brave soldier, and by his successful defence of the city of Metz (1552-3), when he obliged Charles V. to raise the siege after having lost 80,000 men, he became renowned throughout Europe. He also signalized himself at the battle of Renty in 1554. At the request of Pope Paul IV. he was sent to Naples at the head of a French army in 1556; but he failed in this undertaking, and his recall to France barely saved him the mortification of a complete defeat. The constable Montmorency having lost the battle of St. Quentin (1557), the kingdom was in imminent danger, when Guise had the glory of preserving it from further invasion, repelling the imperial troops, and retaking Calais from the English, who had held it since 1847. On the accession of Francis II., in 1559, he seized the reins of government, baffled the conspiracy of Amboise formed by the Protestants against him and his brother, the cardinal of Lorraine, and caused Antoine de Bourbon, king of Navarre, and the prince of Condé, to be arrested, and the latter placed on trial for high treason; but the death of the king (1560) deprived him of his ascendancy. With the constable Montmorency and Marshal Saint André he then formed a kind of triumvirate in order to control the course of the government and to oppose the Protestants. An assault committed in 1562 on a peaceable body of Huguenots by some of his servants and followers, and attended with bloodshed, gave the signal for those bloody religious wars which continued for more than 35 years. At the head of the Catholics, Guise took Rouen, and a little later won the victory of Dreux, where he lost his two colleagues, Montmorency falling into the hands of the Protestants, and Saint André being killed. He had reached the height of his power, when, during the siege of Orleans, he was treacherously shot by a Protestant gentleman, Poltrot de Méré. Guise had a taste for literature, and Tacitus was his favorite author. He left a kind of diary, which was printed in Michaud and Poujoulat's *Nouvelle collection de mémoires pour servir à l'histoire de France*.—HENRI I. of Lorraine, 8d duke of Guise and son of the preceding, born Dec. 31, 1550, died in Blois, Dec. 23, 1588. He witnessed his father's death, and swore vengeance against the Protestants, and especially Admiral Coligni, who he thought had instigated the deed. When 16 years old, he went to Hungary and distinguished himself in the war against the Turks. On his return to France, he fought bravely at Jarnac and Moncontour against the Calvinists, and forced Coligni to raise the siege

of Poitiers in 1569. He was one of the most ardent abettors of the massacre of St. Bartholomew's day (1572), and was present when Coligni was killed. In 1575, having been wounded in the face in a successful encounter with the Calvinists in the vicinity of Château Thierry, he received the surname of Balafré, by which he was afterward commonly known. The following year he was instrumental in the formation of the Catholic league, or "holy union," for the protection of the Catholics, a powerful organization of which till his death he was the head and soul. After the death of the duke of Anjou, in 1584, he covertly aspired to the throne; and being supported by the pope and Philip II. of Spain, who placed large sums of money at the disposal of the French Catholic leaders, he excited the nation against Henry III. and his heir apparent Henry of Navarre, and during the "war of the three Henries" he twice defeated at Vimory and Aulneau the German troops which had been enlisted in aid of the French Calvinists. Notwithstanding the prohibition of Henry III. he entered Paris in triumph, besieged the king in the Louvre, May 12, 1588, during the popular rebellion known as "the day of the barricades," remained the undisputed master of the capital, and could have been proclaimed king on this occasion; but his courage fell short of his ambition. At the end of the same year he was present at the meeting of the states-general at Blois, where most of the deputies were in his interest. A stormy session ensued; the duke demanded to be appointed high constable and general-in-chief of the kingdom, and the royal authority was placed in the utmost danger, when Henry caused Guise to be assassinated by some of the royal body guard. The duke's brother, the cardinal of Guise, who had participated in all his plans, was privately despatched on the evening of the same day.—HENRI II. of Lorraine, 5th duke of Guise, born in Blois, April 4, 1614, died June 2, 1664. Being a younger son, he first entered the church; at 12 he possessed no less than 9 abbeys; at 15 he was promoted to the archbishopric of Rheims; but on the death of his elder brother in 1640, he gave up a profession ill suited to his character, and plunged into all the dissipation and excitement of a worldly career. His follies and love adventures soon gave him unparalleled notoriety. He meanwhile took part with the opponents of Richelieu, was sentenced to death in 1641, and fled to Belgium, where he married the countess of Bossut. After the death of Louis XIII. he returned to France, and indulged in every excess to which his eccentric character disposed him, distinguishing himself occasionally in battle by his bravery and rashness. About this time he fell in love with a Mlle. de Pons, and in order to bring about his union with her went to Rome to solicit the dissolution of his former marriage. While there, hearing of the revolt of Naples under Masaniello, he resolved to improve the opportunity of conquering a throne which he could offer to his mistress, and to which he had he-

reditary pretensions. At the head of 20 followers, with a trifling sum of money and a few casks of gunpowder, he left Rome, Dec. 13, 1647, embarked on a felucca, sailed boldly through the Spanish fleet, and landed at Naples amid the enthusiastic applause of the whole population; but his licentiousness, imprudence, and overbearing manner soon disgusted the Neapolitans, who deserted him and delivered their city into the hands of the Spaniards. He was taken prisoner, April 6, 1648, carried to Spain, and kept in confinement until 1652. He came home just in time to take part in the last scenes of the war of the Fronde. In 1654, with the help of the French government, who placed a fleet under his orders, he sailed again for Naples, but entirely failed in his enterprise. Returning to France, he was appointed grand chamberlain, and passed the rest of his life at the French court. He left a narrative of his first expedition to Naples, which was published by his secretary Saintoyon, under the title of *Mémoires de feu M. le duc de Guise, contenant son entreprise sur le royaume de Naples jusqu'à sa prison* (4to., 1668).

GUITAR (Gr. *kithara*; Span. *guitarra*), a stringed instrument of great antiquity, now chiefly used to accompany the voice. It is of eastern origin, having been known to the Egyptians in a form somewhat similar to that in present use for more than 15 centuries before the Christian era, and was introduced into Europe in modern times probably by the Spaniards, who derived it from the Moors. The Greek *kithara* was, in early times at least, a lyre, and somewhat resembled the modern guitar. The Spanish guitar of the present century, which is the kind now exclusively used, consists of a hollow wooden body of a somewhat oval form about 18 inches in length by 4 in depth, and of a neck of 16 inches, having a finger board with 17 frets. The strings, 6 in number, generally tuned E, A, D, G, B, E, are distended along the instrument, passing over a bridge at the lower end of the body, and being regulated by pegs at the upper end of the neck. They are set in vibration by the fingers of the right hand, while the left is employed to produce the modulations of tone by pressing against the frets on the finger board. The guitar is the favorite instrument of the Spanish people, and is well known throughout southern Europe. In France and England it was once in considerable repute as a solo instrument, but its limited capacity and monotony of tone have brought it into disfavor except as an instrument of accompaniment. The best guitars in the world were made by the Pajez family in Cadiz. An English artist invented a guitar in which the chords are touched by keys instead of immediately by the fingers; this is called the pianoforte or key guitar. Johann Georg Stauffer of Vienna invented in 1823 the *guitarre d'amour*, which is of a much larger size than the common guitar, and which is held with the bow between the knees. Hence its name of knee guitar; it is also called bow and violoncello guitar.

GUIZOT, FRANÇOIS PIERRE GUILLAUME, a French statesman and historian, born of a Protestant family in Nîmes, Oct. 4, 1787. His father, a distinguished lawyer, having died on the scaffold in 1794, he was taken by his mother to Geneva, where he received a classical education. In 1805 he repaired to Paris, and was introduced by Stapfer, the late minister of Switzerland to France, to some influential persons in the literary world. It was at Suard's that he became acquainted with Mlle. Pauline de Meulan, whom, although she was 14 years his senior, he married in 1812. He had already published a *Nouveau dictionnaire des synonymes Français* (2 vols. 8vo., 1809), and a critical essay *De l'état des beaux arts en France et du salon de 1810* (8vo., 1811); he was then engaged in preparing a revised translation of Gibbon's "Decline and Fall of the Roman Empire," in which he was assisted by his wife. The same year he was appointed assistant professor of history at the Sorbonne. His political life commenced with the fall of Napoleon. He was appointed secretary-general of the department of the interior in 1814, of justice in 1815, master of requests in 1816, and councillor of state in 1817. He upheld the principles of the constitutional party to which he belonged by publishing his political essay *Du gouvernement représentatif et de l'état actuel de la France* (1816), and thus became the mouthpiece of those who afterward were known under the name of *doctrinaires*. Under the semi-liberal Decazes ministry he held the post of director-general of the communal and departmental administration, which he resigned in Feb. 1820, on the fall of that cabinet. He now published his political pamphlet, *Du gouvernement de la France depuis la restauration et du ministère actuel*; and the following year, *Des moyens de gouvernement et d'opposition dans l'état actuel de la France* (1821). These were wholesome but fruitless pieces of advice to the government. He had lost his seat in the council of state, and had resumed his historical lectures at the Sorbonne, which attracted considerable attention, when he was ordered to discontinue them in 1822, on account of their liberal tendencies. He then devoted his time exclusively to literary pursuits, producing in succession a revised French translation of the complete works of Shakespeare, with a remarkable introduction: *Essais sur l'histoire de France du cinquième au dixième siècle* (8vo., 1823), an appendix to Mably's *Observations*; a *Collection des mémoires relatifs à la révolution d'Angleterre* (26 vols., 1823 et seq.), translated from the English with biographical sketches and historical notes; a *Collection des mémoires relatifs à l'histoire de France*, from its origin to the 15th century (31 vols. 8vo., 1823 et seq.); the first 2 volumes of his *Histoire de la révolution d'Angleterre*, to the accession of Charles II. (1827-'8); and several essays and papers in various periodicals. In Jan. 1828, he established *La revue Française*, which was published every

two months, nearly on the plan of the English quarterlies. In this year he married his 2d wife, a niece of the first Mme. Guizot; she lived only till 1835, and was also an authoress. In the same year the Martignac ministry restored to him his chair at the Sorbonne and his seat in the council of state; and his eloquent lectures, which were delivered in conjunction with those of Cousin and Villemain, raised him to the highest popularity. He entered the chamber of deputies in Jan. 1830, taking his place among the opposition, bore a part in the parliamentary proceedings which brought about the revolution of July, 1830, and was minister of the interior in the first cabinet appointed by Louis Philippe. He left this post Nov. 8, and resuming his seat in the chamber of deputies, opposed the Lafitte cabinet, and supported that headed by Casimir Périer; after the death of the latter he entered the coalition ministry formed Oct. 11, 1832, under the presidency of Marshal Soult, in which he was at the head of the department of public instruction. For 4 years he frequently appeared before the chamber of deputies to vindicate the general policy of the cabinet, while he paid particular attention to his own department, and among other improvements gave a complete organization to the system of primary instruction. After the dissolution of that ministry, Feb. 22, 1836, M. Guizot remained in comparative retirement for a few months. He resumed his post in the Molé cabinet, but soon quarrelled with his colleagues, resigned office, and joined the opposition, to which he had previously exhibited a strong dislike. After the fall of Molé, he was appointed ambassador to Great Britain, Feb. 9, 1840, and received the most flattering welcome from the English aristocracy. The policy of the Thiers ministry, which since March 1 had directed foreign affairs, was scarcely consonant with his opinions, and exceedingly distasteful to the English; a treaty for the settlement of eastern affairs was concluded between England, Russia, Prussia, and Austria, without the concurrence or even the knowledge of the French government, and M. Thiers, who bitterly complained of having been betrayed by the French ambassador, had to resign his premiership. A new cabinet, the last of Louis Philippe's reign, was formed Oct. 29, 1840, Marshal Soult, minister of war, being its nominal president, while its real head was M. Guizot, minister of foreign affairs. For more than 7 years, in concert with the king, he upheld the system of peace at any price abroad and opposed political reform at home, which eventually resulted in the overthrow of the Orleans dynasty. He at first succeeded in restoring the French government to a participation in the settlement of the eastern question, which fact he announced at the opening of the chambers in 1842; but England and Russia held France in a subordinate position, and even treated its government with a contempt which the latter did not apparently resent. Its subserviency to the dictates of its allies became conspicuous when Admiral Dupetit-Thouars,

having seized Tahiti, was censured by the cabinet as having gone beyond his instructions, and when France was forced to pay an indemnity to Pritchard, the English missionary. Public opinion had been previously so much dissatisfied with the treaty on the right of search, which had been signed merely to please England, that the ministry was obliged to withdraw its sanction. The discontent excited by these and many other causes was not allayed by victories won by the French troops in Algeria in 1845, and by the presentation of several useful bills, including those for the establishment of a complete system of railroads throughout France. The good understanding with England was suddenly interrupted in 1846, by the conclusion of the "Spanish marriages," which were especially the work of Louis Philippe's family ambition; and thenceforth the ill will of the English government, which was loud in its complaints of treachery, was everywhere apparent. Meanwhile the agitation for electoral reform was beginning in Paris, and propagating itself over the country. M. Guizot evinced his contempt for what he considered a trifling matter, and thus greatly added to his unpopularity. He did not foresee the coming revolution; he insisted upon preventing, by force if necessary, the reform banquets which the opposition party had organized, scorned the discontent of the national guards, and reluctantly consented to resign his office, Feb. 23, 1848, when the revolution had actually commenced. He fled to England, where he found a still more hospitable welcome than on his previous official visit; and as soon as he was convinced that his actual political career was at an end, he turned his attention to his former literary pursuits. As early as Jan. 1849, he published a pamphlet *De la démocratie en France*; and in 1850 a *Discours sur la révolution d'Angleterre*, the forerunner of the history which he was then completing and has since published: *Histoire de la république d'Angleterre et du protectorat de Cromwell*, and *Histoire de Richard Cromwell et du rétablissement des Stuarts*. He has moreover produced several essays, among which is his *Étude sur Sir Robert Peel* (of which a new edition appeared in 1858); and has republished with additions several of his former works. Among the number his admirable *Étude sur Washington*, originally prefixed to the *Vie, correspondance et écrits de Washington*, is particularly worthy of mention. Among his other works are: *Vies des poètes Français du siècle de Louis XIV.* (8vo., 1812); *Des conspirations et de la justice politique* (1821); *Histoire du gouvernement représentatif* (2 vols. 8vo., 1821-2); *Histoire générale de la civilisation en Europe*, and *Histoire générale de la civilisation en France*, comprising the substance of lectures delivered at the Sorbonne from 1828 to 1830; *Méditations et études morales* (1851); and *L'amour dans le mariage* (1855). New editions of his *Études sur les beaux arts en général*, *Corneille et son temps*, and *Shakespeare et son temps*, appeared in 1856-8.

He is now engaged in completing his *Mémoires pour servir à l'histoire de mon temps*, of which 4 volumes had appeared in 1858.—ELIZABETH CHARLOTTE PAULINE DE MEULAN, a French authoress, wife of the preceding, born in Paris, Nov. 2, 1778, died Aug. 1, 1827. The daughter of a receiver-general of finance, she lost her father at the beginning of the revolution, and found herself, with her mother, brother, and 8 younger sisters, in very reduced circumstances. As soon as the partial restoration of tranquillity permitted it, she devoted herself to literary pursuits in order to increase their means of living, and by the help of Suard and some other friends was successful. In 1800 she published a novel, *Les contradictions*, which attracted some attention, and a few months later, *La chapelle d'Ayton*, a happy adaptation from the English. In 1801, Suard having established his periodical *Le publiciste*, she undertook the literary and artistic editorship of it. In 1807, being forced by ill health to interrupt her regular labors, she accepted an anonymous substitute who kindly offered himself, and who was no other than M. Guizot, then young and unknown. The intercourse springing from this incident grew into mutual affection, and ended in a marriage which was celebrated April 12, 1812. Thenceforth her attention was given entirely to works for the moral improvement of the young; and she published in succession, *Les enfants*, a series of tales; *Le journal d'une mère*; *L'écolier*, ou *Raoul et Victor* (4 vols. 12mo., 1821), to which the Monthyon prize was awarded by the French academy; *Nouveaux contes* (1823); and *Éducation domestique, ou lettres de famille sur l'éducation* (1826), perhaps her best work, which also gained a prize from the academy. Her *Conseils de morale, ou essais sur l'homme*, were edited after her death by her husband, whom she had more than once assisted in his historical labors.—MAURICE GUILLAUME, a son of François Guizot by his second wife, born in Paris, Jan. 11, 1833, has gained a literary reputation by an essay which obtained a prize from the French academy in 1858: *Ménandre, étude historique sur la comédie et la société Grecques* (1 vol. 8vo., 1855).

GUJERAT. See GUZERAT.

GULDENSTAEDT, JOHANN ANTON, a Russian physician and naturalist of German descent, born in Riga, April 29, 1745, died in St. Petersburg, March 23, 1790. He was educated at Berlin, and took part in the scientific explorations in the remote parts of the Russian empire, ordered by Catharine II. He published works in Latin on natural history and botany, and a number in German on the history, geography, statistics, commerce, &c., of Russia. His most important work was his "Travels in Russia and in the Mountains of Caucasus," published in German at St. Petersburg in 2 vols. (1787-'91), which has been of the greatest value to subsequent writers; a revised and corrected edition was published by Klaproth in Berlin in 1815.

GULF STREAM. See ATLANTIC OCEAN.

## GULL

GULL, a web-footed bird, comprising several genera of the family *Laridae*, of which the typical genus *Larus* (Linn.) is found over the marine portions of the entire world. The bill varies considerably in form and strength, though it is generally straight, with compressed sides, and curved at the end; nostrils lateral and oblong; wings long and pointed; tail usually even; tarsi robust; anterior toes united by a full web, and the hind toe short and elevated. This family has been minutely subdivided by different writers, sometimes on very trivial distinctions, which are of no interest to the general reader, and of very little use to the practical ornithologist. The genus *Larus* contains the largest and best known of the gulls, characterized by a strong hooked bill, nearly even tail, light-colored mantle, and white head. The largest of the gulls is the glaucous or burgomaster (*L. glaucus*, Brunnich), 30 inches long, with an alar extent of 5 feet; the bill about 3 inches, very stout, gamboge yellow with a reddish orange patch near the end of the lower mandible; the general color is pure white, with a light grayish blue tinge on the back and wings. It is an inhabitant of the arctic sea, coming down occasionally in winter as far as New York. It is exceedingly shy, and notoriously voracious, eating fish, small birds, and carrion; it is less noisy than most other species. The eggs are pale purplish gray, with spots of brown and purple. The young, as in gulls generally, are pale yellowish brown, with spots and bars of dusky. The black-backed gull (*L. marinus*, Linn.) is about the size of the last, from which it may be distinguished by the dark slate color of its back and wings, the black white-tipped primaries, and the yellow legs and feet. It is found from the entrance of Baffin's bay to Maine, its favorite breeding places being on the coast of Labrador; in winter it goes as far south as Florida, and is rarely found at any season far from the sea. It is a high, powerful, and majestic flier, resembling in this respect, as well as in its voracious habits, the vultures; it breasts the fiercest gales, skimming along the tops of the waves; it is a good walker, a light but slow swimmer, and no diver. It preys upon fish, young birds, eggs, and any floating carrion—in fact, upon every thing except vegetable food; tyrannical and strong, it is also very cowardly, flying off when the bold little skuas or jagers (*Stercorarius*) attack or approach it. It is exceedingly shy, and very noisy in the breeding season; in captivity it is very long-lived. The breeding season is from the middle of May to the middle of June, and only one brood is raised in a year; the nest, composed of weeds and grasses, is placed upon rocky shelves, and the eggs, usually 3, are about 8 x 2 inches, of a pale greenish gray, with dark spots and blotches; both sexes incubate, and the young are fed at first by regurgitation. The eggs, like those of gulls generally, are good eating; great numbers of the young, when nearly able to fly, are killed and salted as food for the fishermen.



of Labrador and Newfoundland; the old birds are tough and unfit for food. The plumage is soft and thick, and is esteemed for pillows and similar articles. Other species, of nearly the size of the last, and sufficiently described by their names, are the glaucous-winged (*L. glaucescens*, Licht.), and the white-winged (*L. leucopterus*, Faber), the former inhabiting the N. W. coast, and the latter the arctic seas. The herring or silvery gull (*L. argentatus*, Brunn.) is about 28 inches long, and 53 in alar extent; it resembles a small glaucous gull, except that the first 6 primaries are marked with black. This is a very shy species, with a powerful and graceful flight; it feeds principally on herring, and on the usual food of gulls. It is found from Newfoundland to Texas, and goes inland to the western rivers and northern lakes; it breeds from Labrador to Maine, nesting, when persecuted by man, on high trees; the eggs, about 3x3 inches, are usually 3, of a dull yellow color with spots and blotches of umber brown, and are excellent as food. Species resembling the last are the western gull (*L. occidentalis*, Aud.), 25 inches long, with a dark mantle, from the N. W. coast; and the California gull (*L. Californicus*, Lawr.), a little smaller and less dark, inhabiting the Pacific coast. The ring-billed gull (*L. conorhynchus*, Rich.), about 20 inches long, with a blackish brown band on the bill, is found from the arctic regions to Texas, on the western rivers, and the N. W. coast.—In the genus *blasipus* (Bon.), characterized by a long and slender bill, dusky color, and medium size, belongs the white-headed gull (*B. Heermanni*, Cass.); the bill is red, tipped with black; the general color ashy leaden, with the back and wings darker; found in California.—In the genus *chroicocephalus* (Eyton) the bill is moderate, slender, and much compressed; the size is small, and the head in the spring plumage has a dark hood, becoming white in winter; the contrast of black and white makes them very handsome birds. The laughing gull (*O. atricilla*, Linn.), 17 inches long, has the mantle and wings bluish gray, the hood dark leaden gray, and white lines on the lids; found from Massachusetts to Texas. Franklin's gull (*O. Franklinii*, Rich.), 15 inches long, from the western states and the fur countries, has a darker mantle and hood, white lids, and a rosy tint on the neck and below. Bonaparte's gull (*O. Bonapartei*, Rich.), about 15 inches long, has a light mantle, grayish black hood, and a white band divided by a narrow black line around the posterior part of the eye; it is found from Nova Scotia to Texas, on the western rivers and lakes, the Pacific coast, and in the fur countries; in the neighborhood of Puget's sound it is eaten by some Indian tribes.—In the genus *rissoa* (Leach), including the kittiwakes, the bill is long but strong, and the hind toe rudimentary or very small. The 3-toed gull, or kittiwake (*R. tridactylus*, Linn.), 17 inches long, has a pearl-gray mantle, the ends of the outer primaries black, and a general white plumage; it is

found from Labrador and the fur countries to the southern coast in winter. There are 3 other species on the N. W. coast.—The ivory gull (*pagophila eburnea*, Gmel.), about 19 inches long, has an entirely white plumage, with an ivory yellow bill dusky at the base; all the species of the genus are found far at sea in high northern latitudes, where they feed principally on the flesh and fat of cetacean animals.—The larger and the arctic species, the former of which are called goelands, are found also on the European continent. The common gull of Europe is the *L. canus* (Linn.). In some places the larger terns are often called gulls, as their appearance and habits are similar, though the size is smaller.

GUM, an exudation from certain trees, distinguished by its either softening or dissolving in water, and not yielding to alcohol; also by affording mucic acid, when acted upon by nitric acid. The resins, which resemble the gums in origin and appearance, are insoluble in water, but dissolve in alcohol, ether, and the essential oils, and are moreover distinguished from the gums by their inflammability. The gums, as they issue through the punctured bark of trees, are held in solution in the vegetable juices; and as these evaporate on exposure they form a thick adhesive substance, which by further exsiccation may become dry, hard, and pulverizable. By boiling down the juices or the infusions of many plants, a substance of this nature is often obtained, even when the plants are not known to produce it naturally. Flaxseed may thus yield a product which when dried is like gum Arabic. The gummy substances obtained in this way are generally distinguished by the name of mucilage. Though the gums differ in their chemical reactions from amylaceous matter, their elementary composition is usually considered the same, and like that of starch is represented by the formula  $C_{12}H_{10}O_{12}$ . Liebig regards gum as a hydrate of carbon of the formula  $C_{12}H_{10}O_{12}$ . Starch acquires the properties of gum when dried at a temperature of  $266^{\circ}$  F. (See BERRY GUM.) Gums possess the dietetic value of starch and sugar, and in some instances are used as food. The Moors subsist almost exclusively upon gum Arabic while employed in collecting it. It is sometimes the principal means of subsistence to the Bushmen of South Africa, and is eaten also by the apes of the same region. It is given to invalids as a nourishing drink, and its solution may be in some diseases their only nutriment.—Several varieties of gum are recognized, most of which may be referred to one or other of 8 divisions. Those of the first, distinguished by their solubility in water, are chiefly composed of the peculiar principle arabin, and are represented by gum Arabic, the purest of the gums. The second division comprises those which soften and swell in water without dissolving, as gum tragacanth, Bassorah gum, &c. They are in great part composed of arabin, but also contain the principle bassorin. The third division includes those that are par-



tially soluble in water and are distinguished by the presence of the principle cerasin. The gums of the cherry and many other fruit trees belong to this group.—GUM ARABIC may be used as a generic name for the various gums produced by the several species of acacia, many of which are particularly designated by their localities, as the Turkey or Arabic gum, the Barbary or Morocco gum, Cape gum, East India gum, gum Senegal, &c. The first named is the product principally of the *acacia vera* and *A. Arabica*; it is collected mostly in upper Egypt, Nubia, Kordofan, and Darfoor, and is brought from different ports of the Mediterranean. The second is supposed to be obtained from the *A. gummifera*, and is brought from Mogadore and Mazagan. The Cape gum is from the Cape of Good Hope, the product of a species of acacia resembling the *vera*, and named by Burchell the *capensis*. The East India gum, mostly from Bombay, is the product of different species of acacia. Gum Senegal, from Senegambia, is supposed to be obtained from *A. Senegal*, *A. vera*, *A. Seyal*, and *A. Adansonii*. The first named of these is a small tree which forms vast forests in the hottest regions of Africa. These varieties of gum Arabic differ somewhat in purity, hardness, and color. The best real gum Arabic is in rounded or amorphous tears, some of which are as large as nutmegs, some transparent, and some opaque, of light shades of yellow, sometimes red, also white, and of glassy lustre. The gum has a sweetish taste, but no decided odor. Its specific gravity varies from 1.8 to about 1.5. It is readily dissolved in boiling water; but the solution more slowly effected in cold water keeps better. It has an acid reaction, and alcohol added to it causes the gum to fall as a white precipitate. Gum Arabic is used in the arts for producing a glazed surface upon fabrics, as also for stiffening or giving to them a body, answering the same purpose as starch. By increasing the density of liquids in which it dissolves, these are made to retain substances in suspension which would otherwise subside. It is for this purpose introduced into writing ink and various preparations of pigments and of medicines. It is also administered for its own medicinal qualities, which are chiefly of a demulcent character. The mucilage recently introduced, and now so largely sold by stationers, is generally a solution of gum Arabic. In solution it covers and shields inflamed surfaces, and is thought by some to exert beside a positive soothing influence of its own. Mixed with an equal weight of sugar, dissolved and evaporated to dryness, it forms the useful demulcent called gum pectoral. Its nutritive property has already been noticed. The gum is often adulterated with inferior gums, and also with starch and flour. Iodine readily detects the presence of starch or of flour in solutions of gum containing them by the blue color produced.—GUM TRAGACANTH, also called GUM DRAGON, is the product of various species of *astragalus*, especially the *A. verus* of the north of Persia, Armenia, and Asia Minor, and the

*A. gummifer* of Arabia, Mt. Lebanon, &c. It is collected in the months of July and August from the natural exudations of the shrubs, and from those resulting from incisions made in the stem near the root. It is a hard, tough substance, more or less white according to its purity, in very irregular flattened shapes and in tortuous vermicular filaments. It may be pulverized after drying at a temperature of 212°. It has no taste or smell. Its specific gravity is 1.884. It swells slowly in water, partially dissolving, and forms a thick adhesive paste. By boiling with sufficient water, a solution is obtained of similar appearance, and Brande thinks of the composition of that of gum Arabic. Different analyses are given of it, but that of Górrin-Varry is generally adopted; it is as follows: arabin, 58.8 per cent.; bassorin or tragacanthin, 38.1; water, 11.1; inorganic matter, 2.5. Starch is detected in very small quantity in the bassorin. From the ultimate analysis the same chemist deduced the formula  $C_{11}H_{10}O_{10}$ . The uses of gum tragacanth are similar to those of gum Arabic. Apothecaries employ it to give adhesiveness to the ingredients of pills, and confectioners apply it with a similar object to the materials of lozenges. Gum of Bassorah, from Bassorah near the head of the Persian gulf, is of this class of gums, and furnishes the name for the peculiar principle they contain.—CHERRY-TREE GUM, including in this name the exudations of the peach, plum, and other kindred trees, is an inferior quality of gum, somewhat like gum Arabic, and consisting of a portion soluble in cold water, which is arabin, and a portion insoluble, which is the principle named by M. Guérin cerasin. It is applied to no useful purpose.—GUM KINO. The name kino is given to a variety of gums procured in different countries and from very different trees. Dr. Fothergill first gave the name to the gum obtained from the *pterocarpus erinaceus* of De Lamarck, found in Senegambia. This is not now used, and the name usually represents the very dark colored brittle gum, giving a reddish powder, obtained from the lofty tree *pterocarpus maritimum* of the mountains of the Malabar coast of Hindostan. This East India gum was long since analyzed by Vauquelin, who obtained 75 per cent. of tannin, 24 of red gum, and 1 of insoluble matter. It has a bitterish, highly astringent taste. It dissolves in water, cold and hot, giving a deep red color to the infusion. In medicine it is used internally and as an external application for its powerful astringent qualities, suppressing morbid discharges, as in diarrhoea, and arresting hæmorrhage. Botany Bay kino is the concrete juice of the *eucaalyptus resinifera*, a large tree of the natural order *myrtaceæ*, which furnishes sometimes from a single trunk 500 lbs. in a year. Like the East India gum, it is black in the mass, but ruby red in thin fragments, sticks to the teeth when chewed, colors the saliva red, and possesses astringent qualities. West India or Jamaica kino is believed to be the product of the *ac-*

*coloba wifera*, and is said to be obtained by evaporating a decoction of the wood and bark of the tree. Its properties are like those of the East India article; and it is probably the same product as the South American or Caracas kino.

—**GUM MESQUITE** is the product of the mezquite tree, *algarobia glandulosa*, of Texas and New Mexico, brought to notice in 1854 by Dr. Shumard of the U. S. army. It is described as similar in its properties to gum Arabic, exuding spontaneously from the tree, and concreting into tears and lumps of variable sizes, semi-transparent, and of lemon white to dark amber shades of color. It is brittle and easily pulverized, and the fractured surfaces are brilliant. From an ounce to 8 lbs. have been obtained from a single tree, and more, no doubt, by making incisions in the bark. The branches furnish a purer quality than the trunk. The best time for collecting it is the latter part of August. The trees abound upon the plains over regions thousands of miles in extent, and flourish luxuriantly in dry and elevated situations. If the gum could be easily obtained in large quantities, it would become an important commercial article; but an abundant exudation takes place only in unusually dry seasons after an interval of several years. Specimens have been analyzed by Dr. Campbell Morfit with the following results: arabin, 84.967; bassorin, 0.906; water, 11.640; inorganic matter, 3.000; impurities, 0.236; total, 100.049. Elementary composition: carbon 44.706 per cent., oxygen 48.794, hydrogen 6.500. It thus shows a close resemblance to gum Arabic and gum Senegal in composition as well as in its physical and chemical properties. It is kept in the drug stores of the Mexican cities, and considerable quantities have been sent to San Francisco from the Mexican ports on the Pacific.—This country receives its supplies of gums in great part through England, and the following table of the English imports and exports, in cwts., exhibits the extent of the commerce in these articles, not including that of France and the other continental countries of Europe, nor the importations into the United States directly from the original sources of supply:

## IMPORTS.

Gums.	1850.	1851.	1852.	1853.	1854.	1855.
Arabic.....	41,949	46,023	48,484	61,614	40,456	43,900
Senegal.....	2,085	2,738	4,367	6,150	8,171	2,164
Kino.....	107	435	159	101	8,215	611
Tragacanth.....	526	791	1,151	1,800	589	800

## EXPORTS.

Gums.	1850.	1851.	1852.	1853.	1854.	1855.
Arabic.....	14,485	10,025	12,265	14,559	12,517	30,607
Senegal.....	5	.....	29	80	93	338
Kino.....	118	46	169	93	473	33
Tragacanth.....	123	109	167	296	123	181

**GUM RESINS**, inspissated juices of certain plants, obtained by spontaneous exudation or from incisions purposely made. They consist of resin and gum, the proportions varying in the different varieties, and with these are common-

ly associated essential oil and other vegetable substances, as starch, bassorin, extractive, &c. They are most of them hard and dry substances, brittle and opaque, rarely translucent like the resins. Some that are semi-liquid and viscid, as the sagapenum and galbanum, become hard in very cold weather, and may then be pulverized. At a moderate heat these are sufficiently fluid to be strained through a cloth; and all the gum resins may be thus strained and purified by first boiling them in water. They are partially soluble in water or in alcohol, and wholly so in a mixture of these. In water alone the gum dissolved holds for a time the finely divided resinous portion suspended, and thus emulsions are prepared for administering the substances in medicine, which is their principal use. Balsams are distinguished from gum resins by containing benzoic acid. The most important gum resins may be found described under their respective names, as aloes, ammoniac, asafoetida, bdellium, euphorbium, galbanum, gamboge, myrrh, olibanum, sagapenum, scammony, &c. The following table presents the imports and exports of the English market, in cwts., for the years named, each ending Jan. 5:

## IMPORTS.

Gum resins.	1850.	1851.	1852.	1853.	1854.	1855.
Ammoniacum.....	832	891	804	60	19	1,251
Asafoetida.....	520	1,922	1,167	2,170	1,555	1,251
Euphorbium.....	17	12	14	.....	.....	99
Gamboge.....	561	1,490	701	455	178	259
Myrrh.....	645	620	844	252	679	639
Olibanum.....	4,689	11,450	8,587	9,029	13,883	10,807

## EXPORTS.

Gum resins.	1850.	1851.	1852.	1853.	1854.	1855.
Ammoniacum.....	705	223	819	246	168	79
Asafoetida.....	507	1,049	1,176	904	731	795
Euphorbium.....	.....	.....	.....	.....	.....	4
Gamboge.....	496	158	385	1,056	255	373
Myrrh.....	113	968	585	841	373	180
Olibanum.....	4,798	11,990	8,739	8,892	12,756	11,757

**GUM TREE.** See **BLACK GUM.**

**GUMBINNEN**, an administrative district of the province of E. Prussia, bounded N. by Russia, E. and S. by Poland, and W. by the district of Königsberg; area, 6,312 sq. m.; pop. 642,000. Its surface is very level, and extensively covered with lakes and forests. There is little arable land, but the pastures feed great numbers of sheep and horned cattle, &c. Capital, Gumbinnen, situated on the Pissa, 68 m. E. of Königsberg; pop. 7,000.

**GUN**, a fire-arm used for propelling balls or shot. The name in common use is applied to pieces of artillery and to the various sorts of muskets and fowling pieces, but not to rifles and pistols. The large pieces have been treated in the article **CANNON** (see also **HOWITZER**, **MORTAR**, and **SHELLS**); the other varieties commonly included under the term gun will be considered here. The invention of portable fire-arms is attributed to the Italians; and Sir Samuel Meyrick, in a paper in the *Archæologia* of the society of antiquaries, names the year 1480 as the time of their introduction. Cannon had then been used by the English more than 100 years. The

new pieces differed only in size from the cannon, and were fired by a match applied to the touch-hole on the upper side. They were afterward improved by making the hole on one side, and adding a pan to hold the priming, and when introduced into England they had also a sight on the breech for assisting the aim. The earliest record of their introduction is in 1471, when Edward IV. brought with him, on landing at Ravenspur in Yorkshire, 800 Flemings armed with hand guns. In England the trigger in use on the cross bow suggested a similar application to the gun for moving the burning match to the pan, and the guns thus improved were known as match locks. The Germans and Italians appear to have been the principal manufacturers. Among them the crooked stock was next devised. After this the Dutch invented an apparatus for striking fire by the friction of a little wheel of steel against a piece of iron pyrites, and the guns provided with this were known as the wheel lock. The flint lock was introduced in the time of Queen Elizabeth, and has but recently been superseded by the percussion lock. The Chinese and some other Asiatics have hardly yet advanced beyond the match lock.—A gun consists essentially of a straight metallic tube or barrel for holding the powder and ball, the apparatus for firing the powder, and the stock by which the instrument is supported in the act of firing. The last is usually a block of walnut or mahogany, or sometimes maple or ash, shaped to fit the shoulder, against which the piece is held when fired. A rod of stiff wood or iron is attached to most guns, which is used for ramming down the charge and in cleaning out the barrel; and muskets for war purposes are furnished with a bayonet, a pointed instrument of iron which is usually carried reversed upon the extreme end or muzzle of the piece, but which when wanted in service for thrusting may be instantly slipped off, turned around, and again slipped over the muzzle of the barrel, to which it is secured without obstructing its use for firing. Guns are made single and double barrelled, the preferred arrangement of the latter being with the two barrels side by side, each with its own lock. During the 17th century great ingenuity was exercised in France and Spain in devising new forms of guns and pistols, the latter of which are nothing more than the smallest variety of the former; and, as Greener states in his "Gun-nery in 1858," some of the greatest improvements of modern times, those which particularly distinguish the most perfect pieces of the present day, were then first invented, but could not be brought into successful use. In the museum of artillery at Paris is a large collection of arms, among which are some arranged for breech loading, and with 4, 5, and 6 charge chambers, which were devised to revolve, though not as in Colt's plan by the act of cocking. The use of these chambers was no doubt impracticable with the old flint locks. Mr. Greener thinks that more than 60 varieties of breech-loading

guns are to be seen there; and as experiments to perfect these have been extended over 200 years without success, he thinks this "sufficient to prove that breech-loading guns cannot be made sufficiently durable to yield any reasonable return for the extra expense and trouble attending their fabrication." An immense amount of useless labor in this direction would have been saved to mechanics could they have become acquainted with the monuments of past labor and skill stored up in this museum.—The manufacture of guns of all qualities, from the poorest sorts sent to the coast of Africa and worth less than \$1.50 each, and the cheap guns made for the American trade, especially with Indians, to elegantly finished fowling pieces of laminated steel and iron, worth \$175 each, is carried on more extensively at Birmingham, England, than in any other part of the world. In Belgium, France, Holland, and Germany, great progress has been made of late years in the manufacture; and in the United States a remarkable degree of perfection has been attained in the government armories in the application of machinery to the construction of muskets, producing the pieces at the lowest possible cost, and all precisely alike, so that the parts used in the construction or in repairs may be taken indiscriminately for any single musket, or picked out from one and introduced into another. This principle, which also distinguishes American clocks and watches, has been noticed in the article relating to these. The commonest kinds of guns are tubes, formerly made by turning over a flat strip of iron called a skelp, about 3 feet long, 4 inches wide, somewhat thicker and broader at one end than the other, and lapping the 2 edges for welding. The skelps were forged and welded by hand, but this is now sometimes done by rolling, and the barrel is drawn out to its required length as it is welded in the rolls from an original cylinder about one foot long; or, as the most convenient way of obtaining greater thickness at one end than the other, two tubes are employed for each barrel, and the thinner is inserted into the thicker, one end of which is opened out for the purpose, and then the two are welded together. The quality of the barrel depends upon the toughness and elasticity of the iron; the former prevents bursting, and the latter the bulging out of the iron by the explosive force of the powder. From a very early period the superiority of the metal used for horse-shoe nails was well understood, and the old nails, or stubs, were reserved for the manufacture of gun barrels. They were largely imported into England from the continent; and it was not until the supply was becoming insufficient that such success was attained in the use of other equally good materials as to render the stubs comparatively unimportant. Iron of unsurpassed quality was at last made expressly for gun barrels, and methods were adopted of using bars of steel in combination with others of iron, which together formed the mixture called laminated steel, now regarded

as the very best material. Bars for iron barrels are prepared by the process of piling. The selected pieces or scraps are first clipped into bits of the size of stubs, then washed with water, and cleaned from rust with acid; they are next placed in a revolving drum and rolled until they become bright as silver, when they are piled and heated almost to fusion; the ball, weighing from 40 to 50 lbs., is hammered, and then drawn down to the required size in the rolls. The bars thus obtained may be used in a great variety of ways according to the kind of barrel to be made. They may be turned up longitudinally to form plain barrels, the grain of which runs lengthwise with the tube; or coiled in a spiral around an iron rod used as a core, and thus form when the whole is welded together the stub twist, the grain of which follows the spiral; or they may be piled up, 6 bars alternately with as many of steel, and the whole be then forged into one, and rolled into rods  $\frac{3}{4}$  of an inch wide, which coiled in a spiral produce the wire twist barrel; or into rods  $\frac{3}{4}$  of an inch square for being converted into Damascus iron. For this purpose each rod is twisted to the number of 14 turns to the inch, by which its thickness is doubled and its length reduced from 6 to 3 feet; three of these rods are then so laid together that the twists of the middle one run the contrary direction from those of the others, and the whole being heated are welded together and then rolled into a rod  $\frac{1}{2}$  of an inch wide for coiling in a spiral. It presents a beautiful appearance, resembling the Damascus blades, but is probably weakened by over twisting, and in England it is not esteemed so strong as the stub twist barrel. By slightly modifying the process a great variety of patterns may be produced in the figures. Greener describes the most perfect work of this kind as being done at Liège, Belgium. Alternate bars of iron and steel, 22 of each, are piled and rolled into a sheet  $\frac{1}{8}$  of an inch thick; this is then slit into 8 square rods, which are twisted till the lines resemble the threads of a fine screw, and 6 of these are placed together and welded into one. The figure produced is exceedingly fine, surpassing in this respect the finest real Damascus blades, and the steel is said to be of very superior quality. The metal thus prepared is sold by the manufacturers at a franc per pound. Many large Damascus gun barrels and heavy rifle barrels are made with a mere veneer or thin plating of Damascus welded upon a common iron barrel. The fraud is difficult of detection, but is best exposed by the application of sulphuric acid inside the tube at the breech end, when the lines, if present like those upon the outside, are made to appear.—The steel bars prepared by the best manufacturers for the laminated steel barrels are composed of scraps of mild steel, as saws, coach springs, waste from steel pen making, and fragments of various steel tools; these, after being cut into pieces of equal size, are polished in a revolving drum, and then piled and treated in a similar manner to the

stubs. The heating is effected in an air furnace away from contact with the fuel. The quality of the metal is improved by a second piling after being drawn down into bars and again heating, hammering, and rolling. The proportion in which these bars are used with stub iron bars has gradually increased to  $\frac{1}{3}$  or even  $\frac{1}{2}$ . Barrels made of the latter mixture  $\frac{1}{16}$  of an inch thick are calculated to withstand a pressure of 5,555 lbs. to the inch of tube. They are more difficult to work in the boring and filing, and it is the less expense of finishing barrels of soft metal that is the chief inducement for the numerous frauds in these articles. Thousands of guns of common Damascus iron are every year sent to the United States with the mark "laminated steel" engraved upon them, a quality really produced by very few manufacturers.—Next in importance to the quality of the metal is the method of manufacturing the barrels. These are welded in England only at Birmingham and its vicinity, coal being there obtained free from sulphur, and the practice of making a variety of qualities of barrels giving the manufacturers the opportunity of appropriating the furnace fires for the first few hours after being lighted to heating the poorer sorts; for the best require fires that have been long burning. It is the first work of the fires that is appropriated to the poor untwisted barrels intended for the American trade. To this succeeds the welding of the twist barrels. The spirals are prepared from different sorts of metal; the poorer kinds are known as "twopenny or Wednesday skelp," and "sham damn iron," and these are made into spirals merely for the sake of getting the name of "twist barrels," the material being entirely unfit for the manufacture. The coils are knocked off the rods on which they are wound, and the pieces intended for the breech end are heated to a welding heat for about 3 inches, and being removed from the fire are jumped close by striking the end against the anvil; the heating and jumping are repeated, and the spiral is rounded in a groove by a few blows with the hammer. The welding of the end of one spiral to that of the next is a nice operation if made to conceal the joint. If this can be detected at every 6 or 7 inches by a confusion in the lines, it is an evidence of inferior work. When the spirals are all joined to complete the barrel, the length of 3 inches at the breech is again heated, the mandrel is introduced, and the tube is hammered in a groove. The heating and hammering are then extended along the barrel. After this in special cases the whole barrel when comparatively cold is hammered for half an hour with light hammers in a groove, an operation which, if faithfully done, greatly condenses the metal and increases its strength. The difference in the cost of the forging applied to a pair of twist barrels varies from £1 to even less than 1s. 6d. After the barrels are formed they are next bored true and ground. Boring bits of increasing sizes are passed through in succession, till the scales are entirely

removed; and the barrels are then carefully proved as to straightness, and any defects in this respect are remedied. Grinding the outside is performed on large stones which revolve at a terrific rate; the workman lets the barrel revolve in his hands at half the rate of the stone, and produces a perfection of finish equal to that of the turning lathe; even the octagonal sides of a rifle barrel are made in the hand almost exact. To insure perfect form, the best barrels are next turned in a lathe. Being then provided with a temporary plug in the breech, they are sent, or are supposed to be sent, to the proof house; but in London they are required to have their permanent breeches, and the double barrels to be soldered together. In proving, the guns are fired to the number of 129 at once with heavy charges in a building constructed for the purpose, and after this trial are subjected to the most scrupulous examination. Those that are found uninjured receive the government stamp, while all that exhibit defects by bulging, cracking, or otherwise, are sent back to the maker. Most of these are commonly repaired and afterward returned for a second, or it may be third, or even fourth proof. Barrels intended for double pieces are flattened a little on one side by the file, and are then secured by solder. The use of hard solder, which is commonly employed for several inches at the breech end, is highly objectionable on account of the necessity of over-heating the barrels. Those especially which have been perfected by cold hammering must lose all they had gained by this process. A rib is soldered along the top between the two barrels, and another one below, the one for the line of sight, and the other to give attachment to the pipes for holding the ramrod.—The locks are ingenious pieces of mechanism, brought to a high state of perfection in the United States as well as in England. Their quality is next in importance to that of the barrels themselves. No idea of their construction can be conveyed without reference to drawings. Various kinds have been contrived, with the view of substituting some other form of the detonating powder than that employed in the copper percussion caps; but none of these have come into general use. The Prussian military rifle is provided with a peculiar lock, which acts upon a pin that passes through the end of the breech and through the powder that forms the charge, terminating against the hollowed extremity of the elongated ball in which is placed the detonating powder. By thus exploding the powder first against the ball, it is supposed an increased effect is obtained. The stocks are almost all made of walnut, in the United States of black walnut, and are longer or shorter and more or less crooked to suit the taste of customers. In the United States and England they are plain, and it may be inlaid with a few metallic enrichments, not so much, however, for ornament as for use, and also polished; but on the continent of Europe they are frequently elaborately carved, and those of Lebeda of Prague

are famous as models of elegance. By the machinery first applied to shaping them in the U. S. armories a stock is perfectly shaped and fitted from the roughly sawn block in about half an hour, passing in this time through 16 different machines. The metallic mountings for securing the barrel and lock to the stock, and those for the ramrod, &c., are designated as furniture. Most of these may be stamped or pressed from plates; but for the best guns they are formed by hand. The surface of gun barrels is protected from rusting by the process called browning, which it is necessary occasionally to renew in their use. The following mixture is recommended, to be used after standing some weeks: solution of hydrochlorate of iron, 1 oz.; alcohol, 1 oz.; corrosive sublimate,  $\frac{1}{2}$  oz.; strong nitric acid,  $\frac{1}{2}$  oz.; sulphate of copper,  $\frac{1}{2}$  oz.; water, 1 quart. The barrels, being cleansed from greasy matters by lime, are to be moistened every two hours with the mixture. Every night and morning they should be scratched with a steel wire brush, and when the color is sufficiently dark, they should be well washed in boiling water and rubbed. Solution of nitrate of mercury applied many times with whitening produces a beautiful effect upon barrels of inferior quality. Other applications also are employed.—From what has already been stated, it is apparent that the range in the cost of guns must be very great. Greener (p. 280) states as the result of his large experience in the manufacture that "the best gun, or as good a one as ever was constructed, or ever will be, should yield the maker a profit at £35. Cheaper it cannot be made, if honestly the best." The items of material and workmen's prices that make up the cost of some of the poorer qualities of double-barrelled guns are estimated as follows. Single guns of course cost more than half as much. The first column of figures is for twopenny or Wednesbury skelp iron twist barrels; the 2d for sham damn iron; and the 3d for the single barrel "African guns," or "park paling." The table also exhibits the manner in which the work is distributed.

Parts and operations.	1.	2.	3.
Double barrels, patent breeched....	a. d. 12 0	a. d. 7 0	a. d. 2 0
Pair of locks.....	2 0	1 6	0 4
Wood for stock.....	0 6	0 6	0 4
Furniture.....	0 5	0 5	0 2½
Stocking.....	2 0	1 2	0 5
Screwing together.....	3 0	2 0	0 9
Percussing.....	2 0	1 4	0 4
Polishing and engraving.....	1 0	0 9	...
Varnishing and painting.....	0 6	0 4	...
Browning.....	0 6	0 4	0 4
Finishing.....	8 0	...	...
Ramrod tip and worm.....	0 6	0 4	0 3
Small work, nails, escutcheons, wood screws, &c.....	1 0	0 7	0 3
Total.....	£1 8 5	16 0	5 3

—At the United States armories at Springfield, Mass., and Harper's Ferry, Va., guns are made of flat bars of iron 14 inches long, 5½ inches wide, and  $\frac{1}{8}$  of an inch thick, with the edges bevelled so that when turned over into a cylin-

drical shape they will make a perfect joint. The bars are first put into a reverberatory furnace, and when at a white heat are passed through the curving rolls, which have 5 grooves, each of different size, 2 of them open and 3 with tongues upon the upper roll to bend the plate down into the lower groove. The first groove forms the plate into a trough shape; the 2d and 3d contract it gradually, preserving the same form; the 4th is a circular groove, which turns the two edges inward partially; the 5th is still smaller, and of the required size to make the cylinder complete by pressure. The object of so many grooves is to bend the plate gradually, to prevent its being split open. This operation is all done at one heat, the curving of 450 plates being a day's work. Before it is curved, the material is styled a plate, and after, a cylinder; it is called a tube when welded, and a barrel after passing through the first taper groove of the welding machine, because it then receives its shape, subsequent grooves tending only to elongate and change the size. Three workmen and a fireman are required to manage the welding machines. After the plates are curved into cylinders, the fireman puts two into the furnace for welding. He is provided with 8 steel mandrels for as many grooves, the ends of which form a bulb nearly the shape of an egg; the rods are graduated from 0.71 to 0.46 of an inch in diameter. The end of the rod, or rather the centre of the bulb, rests exactly in the centre of the rolls when the barrel is drawn from it in passing through them, the rod being held firmly by means of an iron collar which rests against an iron frame for the purpose. The rolls make 36 revolutions per minute. When one of the cylinders is brought to a welding heat, the foreman thrusts the largest mandrel through it while in the furnace, and conveys it to the welding rolls, and placing the mandrel through the frame, introduces the end into the first groove (which like the second is parallel), by which the cylinder is drawn over the bulb of the mandrel, the latter being held in the frame by the collar near the opposite end or handle. The first assistant stands on the opposite side of the rolls, catches the tube as it passes through with a pair of tongs, and hands it to the second assistant (standing on the same side as the foreman), who is provided with a slim mandrel rod about 3 feet long, which he thrusts into the end of the tube, and by slapping it on a flat iron table 2 or 3 times makes it straight. He then replaces it in the furnace for a second welding heat, while at the same time the foreman takes out the other, and proceeds in the same manner as has just been described. After the second welding heat is taken, the second sized rod is used precisely as the first. It is again straightened as at the first operation, and returned to the furnace to be reheated for passing through the 3d groove. This and the 5 following are taper grooves, exactly the form of the barrel, but diminishing in size to reduce the exterior diameter gradually and elongate it until it is in the last groove rolled to its proper

size and length. The rolls make but one revolution to take it through, although constantly revolving. The butt end of the barrel is placed quickly against the shoulder or butt end of the groove as the rolls revolve; great care is required on the part of the foreman in entering it at the proper place. It is indispensable that the barrel after being passed through the rolls should be restraightened and reheated before re-rolling, as the bulb of the rod chills the interior of the barrel, and it cannot go through a second time without breaking the rod; only a red heat is necessary for each of the taper grooves. Finally, after it has been passed through the 8 grooves with mandrel rods, it is then taken with tongs, and passed through another finishing groove twice, without the mandrel rod, to render it smooth and cylindrical. The welding being completed, the foreman takes the barrel directly to the straightening machine, and enters the muzzle into the large end of the dies, which are of the same length as the barrel. The machine makes 60 revolutions per minute, and the barrel receives a gentle pressure at each revolution given by an eccentric movement, the workman turning it steadily around with his tongs, between each stroke pushing it further within the dies until the whole length is received into them; it is kept in until it is perfectly straight, which requires from 10 to 15 strokes, the dies opening about  $\frac{1}{4}$  inch at each revolution. The barrel being thus completed is ready for coneseating, which is done under tilt hammers.—The machines and workmen as above described will curve and weld about 75 barrels per day, being more than double the number that the same force of men can weld under tilt hammers. About 2,000 lbs. of Cumberland coal are used per day. New Jersey fire sand is used as a coating on the bottom of the furnace, which glazes over and forms a hard bottom for the barrels to rest upon; they are thus exposed only to the clear blaze, and prevented from coming in contact with foreign substances, which would endanger the success of the welding. Two sets of mandrel rods are kept constantly on hand to replace those that get worn or broken. All component parts of the musket, excepting the stock, are thoroughly annealed in furnaces, beside which the hammer and other portions of the lock are case-hardened before grinding and polishing. At every step the tests of gauge and inspection are rigidly enforced, and the ramrods and bayonets tempered to a perfect spring. The barrels are twice proved by firing with 360 and 240 grains of powder, with an ovate ball double the weight of the service ball. The percentage of damage by explosion is not over 1 to 1 $\frac{1}{4}$ . The musket stocks of black walnut are delivered by contract in the rough, and are brought to shape by operations in various machines developed from the principle of Blanchard's lathe; cam movements cause an exact pattern in iron to be followed by the planes, cutters, drills, &c., which cut away and pierce the wood, leaving it

finally of the precise size and shape of the model in its several stages. Such are the machines for shaping the outward form of the stock, the barrel and ramrod grooves, the screw holes, the butt for plate, the receptacle for the lock, &c. With full sets of hands the Springfield and Harper's Ferry armories are each capable of turning out 25,000 muskets per annum. The present year (1859) only about 10,000 will be made in each establishment. The annexed table exhibits the names and number of parts, with the number of operations entering into the manufacture of the present U. S. rifle musket, model of 1855:

Parts.	No.	Opera- tions.	Parts.	No.	Opera- tions.
Tip for stock.....	1	10	Main spring swivel	1	5
Tip rivet.....	1	9	" rivet.....	1	2
Ramrod stop.....	1	8	Hammer.....	1	18
Stock.....	1	15	Tumbler.....	1	9
Butt plate.....	1	10	" screw.....	1	4
" " screws.....	9	6	Bridle.....	1	7
Guard plate.....	1	21	" screw.....	1	4
Swivels.....	9	4	Bear.....	1	2
Guard bow.....	1	7	" spring.....	1	4
" nuts.....	9	4	" screw.....	1	7
Trigger.....	1	10	Main spring.....	1	9
" screw.....	1	4	Lock assembled.....	0	1
Guard assembled.....	0	1	Slide screw washers.....	2	4
" screws.....	9	6	" ".....	2	6
Sight base.....	1	11	Ramrod.....	1	7
First leap.....	1	6	Bayonet.....	1	23
Second leap.....	1	8	" clasp.....	1	16
Steady pin.....	1	1	" screw.....	1	4
Joint screw.....	1	4	Wiper.....	1	6
Base screw.....	1	4	Screw driver wrench.....	1	18
Rear sight assembled.....	0	1	" blades.....	2	11
Front sight.....	1	8	" collets.....	2	8
Breech screw.....	1	10	and rivet.....	2	8
Cone.....	1	8	Screw driver assembled.....	0	1
Vent screw.....	1	4	Ball screw.....	1	5
Barrel.....	1	25	Spring vice bolster.....	1	8
Tang screw.....	1	6	" " slide.....	1	6
Upper band.....	1	9	" screw.....	1	8
Middle ".....	1	11	Thumb screw.....	1	6
Lower ".....	1	9	Sp'g vice assembled.....	1	1
Upper band spring.....	1	7	Tumbler and band.....	2	4
Middle ".....	1	7	" spring punch.....	2	8
Lower ".....	1	7	Tumbler and band.....	2	8
Lock plate.....	1	17	collets and rivet.....	2	8
Magazine cover stud.....	1	4	Tumbler and band.....	1	1
" " rivet.....	1	11	assembled.....	1	2
" " c'tch.....	1	9	Tompson.....	1	2
" " c'tch.....	1	6	Musket assembled.....	84	524
screw.....	1	4			
Feeding spring.....	1	2			
" screw.....	1	4			
" finger.....	1	5			

It is thus seen that the rifle musket and appendages are composed of 84 different pieces, 26 of which are of cast steel, 2 of wood, and the remainder of iron; 524 distinct operations are performed on each musket and appendages, each operation having a price affixed, the work all being done by the piece.

GUN BOAT, a name given till within a few years past to armed schooners and brigs of light draught; but since the late Russian war applied to small men-of-war armed with a few very heavy guns, propelled by steam, and capable of floating in shallow water. The first vessel of the kind built for the British navy was in view of service in the contemplated attack on Cronstadt. It was a screw steamer of 100 feet length on deck, and about 22 feet breadth of

beam, drawing from 6 to 7 feet of water, about 250 tons burden, furnished with an engine of 60 horse power, and with two of the heaviest class guns, and manned by 40 men including officers. The attention of the U. S. government being directed to the vessels of this class which the English continued to add to their navy, the construction of some of much larger dimensions was ordered by congress. The Iroquois, launched at Brooklyn in 1859, is the first completed of 5 of the same size and construction; the other 4, named the Pawnee, Dacotah, Mohican, and Wyoming, being unfinished. These are of the burden of more than 1,000 tons each, furnished with engines of 1,000 horse power, and with 6 heavy guns. The extreme length of the Iroquois is 225 feet, extreme breadth of beam 33 feet 10 inches, depth of hold 16 feet, light water draught 7 feet, or when laden 12 feet. The Narraganset and Seminole are of somewhat smaller dimensions. The largest gun boat of the English navy is the Intrepid, which measures 200 feet in extreme length, and 32 feet 3 inches in extreme breadth, with 14 feet 6 inches depth of hold, and 11 feet draught of water. The English have added vessels of this class with great rapidity to their navy, having now in all about 160 completed, all of which are propellers, and over 100 of which are in commission. The French, not appreciating them so highly, have had but 20 in their navy, but orders were recently given for the construction of more. Gun boats are not adapted for service in a heavy sea, and are not expected to take the place of large frigates and ships of the line. Their special object is to carry the formidable ordnance of the largest ships to the attack of forts and into rivers and harbors which are beyond the reach of vessels of large draught; and in engagements at sea they possess the qualities of fleetness and easy management.

GUN COTTON, an explosive preparation produced by the action of dilute nitric acid and sulphuric acid upon cotton, brought to public notice in 1846 by Prof. Schönbein of Basel, Switzerland. A similar explosive compound appears to have been produced in 1832 by Robiquet, by separating the insoluble powder after the addition of water to a solution of saw dust in strong nitric acid. Braconnet in 1833 described a white inflammable pulverulent substance which he named xyloidine (Gr. *ξύλον*, wood), obtained by the action of concentrated nitric acid upon starch, and various forms of woody fibre. Pelouze experimented upon this in 1838 with a view of its application to artillery purposes.—Different methods are given of preparing gun cotton. That proposed by Mr. Thomas Taylor of London in 1846 is recommended as one of the most convenient, though it is best to adopt the exact strength and proportions of the acids, as since given by Mr. Edward Hadow and presented below. Mr. Taylor's process is to mix in any convenient glass vessel 1½ oz. by measure of nitric acid (sp. gr. 1.45 to 1.50) with an equal quantity of sulphuric acid (sp. gr. 1.80),

and, when the mixture has cooled, place 100 grains of fine cotton wool in a Wedgwood mortar, pour the acid over it, and with a glass rod imbue the cotton as quickly as possible with the acid; as soon as the cotton is completely saturated, pour off the acid, and with the aid of a pestle quickly squeeze out as much of the acid as possible; throw the mass into a basin of water, and thoroughly wash it, either in successive portions of water, or underneath a tap, until the cotton has not the slightest acid taste; finally squeeze it in a linen cloth, and dry it in a water bath. Mr. Hadow obtained the best results by mixing 89 parts by weight of nitric acid (sp. gr. 1.424) with 104 parts by weight of sulphuric acid (sp. gr. 1.838). The sulphuric acid has no direct action upon the fibre; its effect is to take up the water from the cotton and prevent the nitric acid from dissolving the compound, which it does in part when employed alone. Prof. Ellet steeped the cotton in a mixture of nitre and sulphuric acid. The cotton is not altered in appearance by being subjected to this process, but it has gained about 75 per cent. in weight, and has acquired several new properties. It is harsh to the feel, and crepitates when pressed in the hand. It is electrically excited by drawing the fibres through the fingers. When freshly prepared with particular care it is soluble in ether, and forms the adhesive liquid already described under COLLOID. If this solution be poured upon cold water, the ether evaporates and leaves an opaque film, which taken off and dried is an explosive paper. At the temperature of 370° F., or lower according to Dr. Marx, gun cotton explodes, but it produces so little heat that a wisp of it may be ignited in the open hand without injury; and if upon a heap of gunpowder it is carefully brought to the explosive temperature, it may flash off without firing the powder. When confined it exerts in exploding a much greater power than gunpowder, but so instantaneously that it is not found applicable to the purposes served by the latter material. Guns are liable to be burst by it before the exit of the ball can give room to the expansive force of the gases produced; and in blasting, the rock is not shaken by it at a distance from the charge. Its action is too much like that of the fulminates to admit of the useful applications at first anticipated. It is like these, moreover, exceedingly dangerous to prepare and keep in any considerable quantity, and is open to the further objection of rapidly absorbing moisture from the atmosphere to the extent of nearly its own weight, which must be expelled by drying before the material can be employed. It also decomposes spontaneously when kept for some time. The products of its combustion are carbonic acid, water, and nitrogen, and, when not very carefully prepared, nitrous acid also. This and the water are opposed to its use in fire-arms. Its freedom from smoke would strongly recommend its use in mines, but its cost compared with that of gunpowder, and the other objections named,

have caused it, after several trials in different countries, to be given up. The composition of gun cotton has been commonly expressed by the formula of Pelouze,  $C_{24}H_{17}O_{17}, 5NO_2$ , which corresponds to an increase in the weight from that of the raw cotton of 75 per cent.; and Pelouze found that this increase was constantly from 74 to 76 per cent. Other chemists, however, obtained different results; the increase of weight being variously stated from 65.4 per cent. to double the original amount. The most elaborate experiments have been made by Mr. Hadow. He found that the product varied materially with the strength of the acid, and that the water in the cotton also served to modify the composition of the product. With acids of variable strength he obtained compounds ranging in increase of weight from 40 per cent. upward; but with a repeated immersion in acid of the strength proved to be the best, he concluded that there were at least 3 definite compounds, one represented by an increase of 64 per cent. in weight, one by 72, and one by 82.

GUN-SHOT WOUNDS, injuries caused by the discharge or bursting of fire-arms, consisting of severe contusions with or without solution of continuity. They are of two classes, according as the explosion of the powder does or does not carry solid projectiles. Slight wounds from powder alone are properly burns; but if the quantity of powder be large or in a confined space, serious and fatal contusions and lacerations may ensue; not only the expansion of the liberated gases, but the unburned portions of powder, and the contact of surrounding bodies put in motion by the explosion, of wads, and of pieces of burst weapons, are to be considered in these complicated wounds, though their treatment is ordinarily the same as for burns, lacerations, and contusions from other causes. These wounds are purely mechanical, and not poisoned, as was formerly supposed; of course they are more dangerous in proportion to the contiguity to vital organs; an explosion from a pistol introduced into the cavity of the mouth or near the thoracic or abdominal cavity might prove fatal, while the same on the back or limbs would be of trifling moment. A wound from a musket ball in a fleshy part presents an opening of entrance, smaller than the ball in most cases, and with livid and inverted edges, and the opening of exit, if there be such, larger, more ragged, and with everted edges; if the ball was fired very near, the entrance is larger than the exit; the importance of these facts in legal medicine is evident, as it often enables an expert to tell the direction and the distance from which a wound was received; the diminished velocity of the ball, its more rapid rotation on its axis, and its consequent more lacerating progress, explain the larger and more irregular opening of its exit. A very slight obstacle is sufficient to divert a ball from its original direction, causing singular eccentricities in its course; a trifling obliquity of surface,



or difference of density in the parts struck, may produce the most circuitous passage; the records of military surgery show that a ball may enter on one side of the head, neck, chest, abdomen, or limbs, and pass out on the other, having apparently passed directly through, whereas it has really passed entirely round; many of these cases are very curious and almost incredible. Spent balls cause injuries of great violence and with little apparent external wound; these cases were formerly attributed to the wind of the ball, from compression or displacement of air in its course; it is now known that a ball after a certain period of its course, from the resistance of the air, the attraction of the earth, and other causes, acquires a rotatory motion on its axis, the more rapid as its progress is nearly ended; if a ball with such a motion strike a part of the body, it does not pierce or carry it away, but simply rolls over it like a wheel, crushing the unyielding and resisting tissues, without necessarily lacerating the skin—contusing the viscera, for instance, without opening the abdominal cavity. A ball in its course may meet and force into the body pieces of clothing, bone, or other foreign bodies, more mischievous than the original projectile. The pain of a gun-shot wound is dull and heavy, and by no means so inconsiderable at the moment of infliction as is generally supposed, though in the excitement of battle it would be less noticed than a sabre or bayonet wound. The bleeding is generally less externally than would be supposed, unless a large artery be severed, as in other lacerated and contused wounds. The constitutional disturbance is great and peculiar; the paleness and coldness of surface, trembling and weakness of limbs, faintness, alarm, and confusion of mind, are more marked than in other kinds of wounds of equal severity. In common cases, inflammation comes on in the course of 24 hours, with swelling, stiffness, and pain; pus forms on the 3d or 4th day, and in the course of the next 5 days more or less of the parts torn by the ball slough away; this over, granulations form, the wound contracts, and heals in 6 or 8 weeks, the lower opening closing first. In healthy persons the constitutional disturbance is neither great nor of long duration. In unhealthy constitutions, and after improper applications or the unavoidable exposures of a campaign, inflammation runs high, the suppuration is profuse and obstinate, and even after long continued treatment the patient recovers with a disabled limb or an enfeebled body. If the ball or foreign body carried with it enters a sensitive or vital part, there will be no ease nor safety until it comes away; but if it enters parts without much sensibility and presses upon no nerve, it may remain for years without inconvenience. Mortification of a limb after a gun-shot wound may arise from the severity of the wound, the excess of inflammation, or division of the large blood vessels. Another dangerous complication of these wounds is secondary hæmorrhage from

excess of arterial action, separation of sloughs from arteries, ulceration of their coats, or general inflammatory exudation; this is most likely to occur in persons of sanguine temperament, when exposed to the depressing influences of hospital life. The prognosis in these wounds should be given with much reserve, as it is impossible in most cases to predict the exact result; if the thoracic and abdominal cavities or the joints are penetrated, or any important organ is wounded, with injury of large vessels or nerves, or comminuted fracture of bones, the danger of a fatal termination is great. The experience of the battle field, and unfortunately of civil life in our large cities, affords remarkable instances of survival for several days after the most frightful injuries and wounds of vital organs; to mention from the latter only two instances, one yet fresh in the mind of the public—the pugilist Bill Poole of New York lived for some time with a ball lodged in the substance of the heart, and Virginia Stewart, a woman of the town in the same city, lingered for several days after a pistol bullet had passed through her brain. The wounds made by the conical balls sent from the recent improved rifles are attended with more than usual laceration of soft parts and splintering of the bones, and the consequent relative fatality in war is considerably greater than with the old muskets. After death from these wounds, caused by a fatal shock to the nervous system when any vital organ is penetrated, a remarkable flaccidity of the muscles and serene expression of countenance are generally noticed; the wound is either too benumbing, or the death too sudden, to permit the agony of dissolution and its accompanying ghastliness and rigidity.—The treatment of simple gun-shot wounds does not materially differ from that of lacerations and deep punctures. Cleansing of the openings, the arrest of hæmorrhage, stimulants and opiates, antiphlogistic and soothing applications, free exit of pus, and rest of the part, are the principal points to be attended to; if there is but one opening, search should be made, by dilatation if necessary, for the ball or other foreign body, which should be extracted if it is likely to prove inconvenient or dangerous; secondary hæmorrhage will require compression, cold, caustic, or the ligature, according to circumstances. In cases of severe laceration with splintering of bones, the question of primary or secondary amputation becomes one of the most difficult the surgeon has to decide; military surgeons differ on this point, though the weight of authority and experience is in favor of primary amputation, choosing the medium between those who let the knife follow the shot and those who delay till the patient is nearly exhausted by pain, previously ascertaining that there are no other fatal injuries. The treatment of complications must be conducted on the general principles applied to similar conditions from other causes. When small shot are fired into the body from a considerable dis-

tance, they are much scattered and near the surface, and may generally be picked out with a cataract needle; when the discharge has been very near the person, the shot, entering in a compact mass, produce a lacerated wound requiring the same treatment as for a bullet. Grains of powder may be picked out one by one, and the discoloration much diminished by the constant application of olive oil. The excitement of an eczematous inflammation on the skin by a corrosive sublimate solution has, according to Prof. Busch, been found efficacious in detaching the granules of powder from recent burns. In wounds from cannon shot, the question is generally that of amputation, and its treatment and consequences. In military hospitals, the sequelae of gun-shot wounds, traumatic fever, hospital gangrene, phlebitis, abscesses, and exhausting suppurations, destroy many who would recover in civil practice.

GÜNDERODE, KAROLINE VON, a German poetess, born in Karlsruhe in 1780, died in 1806. She became canoness of a chapter in Frankfurt-on-the-Main, and under the name of "Tian" wrote a number of poems remarkable for passionate feeling and facility of language. Of a sensitive and impressible disposition, she conceived, it is said, an attachment for the philologist Creuzer, the unhappy result of which induced her to put an end to her life by stabbing herself through the heart. She was on terms of great intimacy with Bettina von Arnim, who has published their mutual correspondence, under the title of *Die Gunderode* (2 vols., Grönberg, 1840); translated by Margaret Fuller (Boston, 1842). Her literary remains consist of *Gedichte und Phantasien* (Hamburg, 1804) and *Poetische Fragmente* (Frankfort, 1805). Her *Gesammelte Dichtungen* was edited by Fr. Götz and published in Mannheim in 1857.

GUNDUOK, a river of Hindostan, which rises N. of the Himalaya mountains, and, after cutting a passage for itself through that chain, flows in a S. E. direction to Kajeepoor, where it falls into the Ganges, in lat.  $25^{\circ} 89' N.$ , long.  $85^{\circ} 16' E.$  Its course is estimated at 400 m. The scenery, at its emergence from the Himalaya range, is magnificent. The river banks are either precipitous cliffs or forest-clad flats, while in the distance are seen through the vistas the snow-crowned summits of stupendous mountain peaks. In the upper part of its course it is called Salgrami, from a singular species of stones found in its channel, and held sacred by the natives; they are mostly round, and are generally perforated in one or more places.

GUNDWANA, an imperfectly defined tract of S. India in the Deccan. It may be said to lie between lat.  $19^{\circ} 50'$  and  $24^{\circ} 80' N.$ , long.  $77^{\circ} 88'$  and  $87^{\circ} 20' E.$ , and to comprise the British districts of Sangor and Nerbudda, Chota Nagpoor, Sirgooja, Singrowli, part of Nagpoor, the Out-tack Mahals, &c.; length about 400 m., breadth about 280 m. The climate is unhealthy. The surface is in general mountainous, ill watered, and covered with jungle. The Gonds or Koonds,

the hill tribes, who took refuge in its mountains and fastnesses from the invaders of the more fertile regions, are supposed to be the aborigines of Hindostan. They are a savage, marauding race, who frequently descend upon the plains and plunder the occupants. They are Brahmins, but abstain from no flesh save that of the ox, cow, and bull. The more fertile tracts of Gundwana were subdued at an early period by the Mahrattas, and made nominally tributary, but it was found impossible to collect any revenue from the vanquished people without undertaking a regular campaign for that purpose. Portions of it were annexed to the Anglo-Indian empire in 1818 and 1853. The rest is also under British control.

GUNNERY, the science of regulating and directing the motions and effects of projectiles from guns. The theory of the motion of a body projected in free space, either parallel to the horizon or in an oblique direction, by the force of gunpowder, is very simple, and rests upon this single consideration: that while the body moves forward by the impulse given to it, it is at the same time constantly descending toward the ground through the force of terrestrial gravity; and as terrestrial gravity is uniform, and constantly the same at all places at nearly the same distance from the centre of the earth, the body descends by a force that acts constantly and equally. By these two motions the body is carried over a certain space in a perpendicular direction, while it is carried over a certain other space in a horizontal or oblique direction, and by the composition of these two motions the real path of the projectile becomes a curve. But the mathematical relation of these two spaces to each other is that relation which constitutes the property of the parabola; the path of a body projected into free space by the force of gunpowder, therefore, is the parabolic line. There are two propositions which embrace the general theory of projectiles; one is, having the direction and initial velocity, to determine the greatest height to which the projectile will rise, and its random or horizontal range; the other is, with the same data to determine the range on an oblique plane. Before, however, applying these two propositions, and the theorems deduced from them, to the practice of gunnery, it is necessary to have recourse to experiment for information upon various subjects connected with the explosion of gunpowder, and the discharge of projectiles. So entirely inapplicable are the theorems without such experiments, that it must be candidly admitted that they are of no practical value except in cases where the velocity of the projectile does not exceed 500 feet a second; and even here they give only an approximation to the truth. The enormous resistance made by the air to all projectiles moving with any considerable velocity renders useless the most elaborate investigations of the modern analysts, who, according to Dr. Hutton, have assumed a very erroneous law of resistance in their calculations.

How great the effect of this resistance is may be inferred from another statement of Dr. Hutton, that some projectiles, "which in the air range only between 2 and 8 miles at the most, would *in vacuo* range about 10 times as far, or between 20 and 80 miles." "The effects of this resistance are also various, according to the velocity, the diameter, and the weight of the projectiles; so that experiments made with one size of ball or shell will not serve for another size, though the velocity should be the same; neither will the experiments made with one velocity serve for other velocities, though the ball be the same." The credit is given to the English mathematician, Benjamin Robins, of having been the first to attempt to systematize and perfect the theory of gunnery in his work entitled "New Principles of Gunnery" (1742); and he is also regarded as the originator of the ballistic pendulum, the instrument in common use for determining the velocities communicated to balls by the explosion of gunpowder under all the various circumstances arising from differences in the amount and description of powder, weight of ball, windage, length of bore, and nature of the metal, &c. Mr. Robins gave particular attention to the explosive force of gunpowder, which is the fundamental subject of inquiry in gunnery; and by means of the ballistic pendulum he made a great number of experiments with gun barrels, varying the charges of powder. Similar experiments, in which all sizes of mortars and a variety of small charges of powder were employed, were carried on under the direction of Dr. Hutton, at Woolwich, in 1778; but they were all at the elevation of 45°, and consequently defective in all the other angles of elevation as well as in the higher charges. In 1784 and 1786 other experiments were carried on in the same place, with various angles of elevation indeed, but with the same quantity of powder in each case, and that a small one; so that they all nearly agreed with the parabolic theory. From them were obtained some of the laws for the quantity of powder, the weight and velocity of the ball, the length of the gun, &c., which are stated by Dr. Hutton as follows: the velocity of the ball varies as the square root of the charge directly, and as the square root of the weight of the ball reciprocally; and some rounds being fired with a medium length one-pounder gun, at 15° and 45° elevation, and with 2, 4, 8, and 12 ounces of powder, gave nearly the velocities, ranges, and times of flight contained in the following table:

Powder.	Elevation of gun.	Velocity of ball.	Range.	Time of flight.
2 oz .....	15°	860 ft.	4,100 ft.	9"
4 .....	15	1,280	5,100	13
8 .....	15	1,640	6,000	14½
12 .....	15	1,680	6,700	15½
2 .....	45	860	5,100	21

On March 29, 1781, our countryman Benjamin Thompson (afterward Count Rumford) read before the royal society of London a paper pub-

lished in part ii. of its "Philosophical Transactions" for that year, in which he gives the results of some "New Experiments upon Gunpowder," together with an "Account of a new Method of Determining the Velocities of all kinds of Military Projectiles, and the Description of a very Accurate Eprouvette of Gunpowder." The new method here spoken of depends upon the principle that "from the equality of action and reaction it appears that the momentum of a gun must be precisely equal to the momentum of its charge; or that the weight of the gun multiplied into the velocity of its recoil is just equal to the weight of the bullet and the powder multiplied into their respective velocities." If a gun, suspended in a horizontal position by two pendulous rods, and provided with the means of measuring the arc of its ascent, "is fired with any given charge of powder, but without any bullet or wad, and the recoil is observed; and if the same piece is afterward fired with the same quantity of powder and a bullet of a known weight, the excess of the velocity of the recoil in the latter case over that of the former will be proportional to the velocity of the bullet; for the difference of these velocities, multiplied into the weight of the gun, will be equal to the weight of the bullet multiplied into its velocity." The agreement between Mr. Thompson's new method of determining the velocity by the recoil, and the old method by the pendulum, is remarkable in some instances. Thus, in the 5 experiments from the 88th to the 92d inclusive, the sum of the velocities by recoil is 5,186 feet, and by pendulum 5,185 feet in a second, the difference being only one foot; and the greatest difference, that of the 90th experiment, is only 89 feet—not so great a difference as frequently occurred in the most careful repetition of the same experiment. The greatest difference of all appears in the 85th experiment, where the velocity determined from the recoil exceeds that shown by the pendulum by 846 feet in a second. This is accounted for, however, by the diminution of velocity due to the resistance of the air during the passage of the bullet from the mouth of the piece to the pendulum; for in this instance the bullet was projected with great velocity, and was very light, and consequently more liable to be retarded by the resistance. To put the matter beyond all doubt, Mr. Thompson made a computation according to the method laid down by Sir Isaac Newton (but adopting the resistance determined by the experiments of Robins, which is 8 times as great as that of Newton), and found that the loss of velocity between the barrel and pendulum must have been 835 feet in a second in this particular instance, leaving the trifling difference of 11 feet only unaccounted for.\* We shall speak of this method in detail when we come to the experiments of Major Alfred Mordecái of the U. S. ordnance department.—Robins's work, to which we have re-

\* Rumford's experiments were republished in London in 1802, with considerable additions.

ferred, attracted the attention of the celebrated Euler, and was translated into French and published by Lombard in 1788. Previous to this, however, MM. D'Arcy and Le Roy had applied the ballistic method of Robins, with some ingenious changes in the means of measuring the arc described by the pendulum, to a large number of experiments, which they published in the "Memoirs of the Academy of Sciences" in 1751. It was with the help of the same method that D'Arcy made the subsequent experiments, of which he gave an account in his *Essai d'une théorie d'artillerie*, published in 1760, where also are found numerous results of the variations in the initial velocity of the ball depending upon the length of the piece. The block of the pendulum used by D'Arcy was of steel, and his balls were made of lead. But of all who took up the subject in the last century, no one accomplished so much as Hutton, who continued up to 1791 the experiments he had begun in 1775. He changed the weight of the pendulum, the size of the ball, and the charge of powder, so as to give great range and variety to his investigations, all of which are published in his "Tracts on Mathematical and Philosophical Subjects" (8 vols. 8vo., London, 1812), and continue to constitute the text book of the student. The experiments comprised in the years 1783 to 1786 were translated into French, and published in 1802 under the title of *Nouvelles expériences d'artillerie*, by Col. Villantroys; those of 1787 to 1791 were published under the same title in 1826 by M. Terquem. In 1815 Dr. O. Gregory, mathematical master, and afterward professor, in the military school at Woolwich, constructed a pendulum weighing 7,408 pounds, nearly 3 times as large as the largest used by Hutton, upon which he practised with a 24-pounder. He combined the two separate methods employed by Hutton and D'Arcy for measuring the arc of oscillation at the upper and lower parts of the pendulum; and in order to obtain the exact centre of percussion of the ball upon the block, the front surface of the latter was covered with a sheet of lead. Curious details concerning this enormous structure, and some of the results it led to, may be found in the *Annales de physique et de chimie*, and the *Voyage dans la Grande Bretagne* of M. Charles Dupin. Another method has been employed, though comparatively little, for determining the initial velocity of projectiles; that is, rotating machines. Antoni, who attributes the invention to a mechanic named Mattel, was the first to make use of it. He gives an account of his experiments in his *Esame della polvera* (Turin, 1765, translated into French by M. de Flavigny in 1778). The machine used by Antoni consisted of a horizontal circle, supported at the centre upon the upper extremity of a vertical axis, and answering as a stand for a cylindrical envelope of paper; the rotary motion is given to this cylinder by means of a weight attached to a cord which passes over a fixed pulley. In 1808 Col. Grobert proposed a machine

in which he substituted in the place of the cylindrical surface of paper two disks or circles of pasteboard, arranged perpendicularly on the same axis passing through their centre. This apparatus, employed by the members of the institute charged with its examination, in making some experiments upon the initial velocity of musket balls, was put in motion by the same means as the instrument of Mattel. Finally, Dr. Gregory, while he adopted the disks of Col. Grobert, substituted for the weight that gave motion to his instrument a spring enclosed in a barrel similar to that of a watch, which communicated to the disks by means of toothed wheels an equal and regular motion.—This brief historical summary is sufficient to give an idea of the labor that has been bestowed upon the problem of the initial velocity of projectiles, and of the importance attached to its solution; and it will be useful to introduce here an explanation of that term. The effects of artillery are produced by means of 3 principal bodies—a gun, a charge of powder, and a projectile. The powder, or rather the elastic fluid disengaged in the combustion of the powder, is the agent; the projectile is the resistance put in motion; and the gun is the machine by means of which the agent acts. Now, the force exerted upon the ball during the time it is in the gun gives rise to the term initial velocity, which is in fact the space the ball would pass through in a unit of time, and in a direct line, at the moment of leaving the mouth of the gun, if nothing interfered to change its motion. Of all the questions relating to artillery, this of the initial velocity is practically the most important. The knowledge of it is indispensable in order to form a correct estimate of the effect of the projectile, and to determine the amount of powder necessary to produce this effect. Between the years 1842 and 1846 experiments were made at L'Orient with the gun and ballistic pendulums; and in 1848 a similar series was made at Washington under the direction of Major Mordecai. The cannon pendulum and its ballistic pendulum, used by Major Mordecai, were made, with some modifications in the details, on the plan of those recently erected at Metz, in France. "The principal conditions to be fulfilled in the arrangement of these pendulums were: 1, that the pendulum block should be capable of sustaining without injury the impact of balls of large calibre moving with great velocity; 2, that the core or part of the block which receives the impact of the ball should be susceptible of being easily and quickly renewed after each fire; 3, that the frame of the gun pendulum should be capable of receiving guns of various calibres; 4, that arrangements should be made in each pendulum for adjusting the height of its centre of oscillation, so as to make it coincide with that of the line of fire, in order to prevent violent shocks on the axis of motion; 5, that the apparatus should not be liable to be affected by hygrometric changes in the atmosphere." For a detailed description of the manner in which

these conditions were fulfilled the reader is referred to Major Mordecai's report; a general notion of the two instruments may be had from the following abridgment, in which the language of the experimenter is principally used. The block of the ballistic pendulum is of cast iron in the form of a hollow frustum of a cone with a hemispherical bottom. The opening in the face of the block is partially closed by an iron plate, which serves to retain the sand used for filling the hollow of the block; and in the centre of this plate is a circular opening through which the ball passes, striking on a sheet of lead. The sand which forms the chief part of the core of the pendulum block, and which receives the impact of the balls, is contained in cases made of strong leather stretched over iron frames. When the sand is compressed by the ball, the case, or bag, expands laterally, until it is supported by the sides of the pendulum block. The block is suspended by means of 4 straps of wrought iron attached to a horizontal shaft of the same material; the latter terminates in knife edges, made of hardened steel, which rest in Vs of the same metal. The suspension straps terminate at their upper ends in collars fitted with accuracy to the shaft, and secured from turning; the whole rests on two stone piers. The work is fitted together in such a manner that the line joining the centres of the two collars for the pendulum block, which are thus formed by the two pairs of straps, shall be in a plane perpendicular to the axis of the shaft at its middle point, and shall be also perpendicular to a plane passing through the axis of this shaft and the middle of the line in question, which line coincides with the axis of the block. Finally, the vibration of the pendulum is measured on a brass limb placed under the axis of the block, by means of a slider, also of brass, which moves on this limb, and is held at any point by the pressure of a light spring. The suspension frame, the supports, and the general arrangement of the gun pendulum, are similar to those of the ballistic pendulum in every respect, except the means of attaching the gun to the frame; and both systems are provided with adjusting weights for the adjustment of the centre of gravity and centre of oscillation. The total weight of the gun pendulum is 10,500 lbs., and the total weight of the ballistic pendulum is 9,358 lbs.; and such is the lightness of the frames in proportion to the whole weight, that the pendulums are found to possess a great degree of sensibility; when vibrating in an arc of 14°, they lose about 36" in one vibration; in an arc of 4°, about 25". When set in motion in an arc of 12°, the gun pendulum continued to vibrate about 24 hours, and the pendulum block (empty) about 80 hours. The proper distance of the two pendulums apart is determined by experiment to be 55 feet; and in order to intercept the blast of the gun as much as possible, a fixed screen of 2-inch oak plank is placed 17 feet in front of the face of the pendulum block, having a hole in it

12 inches in diameter for the passage of the ball. The penetration of the 32-pounder balls in the sand of the pendulum block is about 4 feet. In speaking of the experiments of Count Rumford, we observed the remarkable coincidence between the initial velocities as determined by the pendulum and by the recoil; and that coincidence is confirmed by the experiments at Washington, as appears in the following extract from the summary of the experiments with the cannon pendulum:

EXPERIMENTS WITH THE 24-POUNDER GUN.

No. of rounds.	Powder.		Ball.		Initial velocity, feet.	
	Kind.	Weight.	Windage, inches.	Weight, lbs.	By ballistic pendulum.	By gun pendulum.
3	A.	4 lbs.	0.185	30.98	1,265	1,238
3	"	"	"	27.68	1,239	1,243
3	"	"	"	25.83	1,273	1,239
3	"	"	"	21.08	1,544	1,565
3	"	"	"	17.68	1,674	1,651
3	"	"	"	9.29	2,225	2,168
3	"	"	"	4.43	....	2,170
1	"	"	"	"	2,952	....
1	A. 1, 2	4 lbs.	0.907	24.25	1,681	1,613
3	"	"	"	"	1,573	1,638
3	"	"	0.115	"	1,459	1,479
3	"	"	0.245	"	1,293	1,277
3	"	"	0.355	"	1,197	1,194
3	"	6 lbs.	0.115	"	1,749	1,755
3	"	"	0.245	"	1,396	1,393
3	"	"	"	"	1,598	1,599
3	"	"	0.355	"	1,485	1,437
3	F. 1, 2	"	0.115	"	1,554	1,547
4	"	"	0.245	"	1,442	1,436
3	"	"	0.355	"	1,388	1,316

Major Mordecai says: "The general coincidence of the results obtained by the gun pendulum with those of the ballistic pendulum, in such a number and variety of cases, cannot be considered accidental, and it affords strong presumption of the correctness of the formula by which the former results are computed." Major Mordecai's experiments confirm Dr. Hutton's conclusion that a great difference in velocity arises from a small degree of windage. The former states his conclusion in the following language: "The differences in the velocities of balls of different diameters are proportionate to the differences of windage; or in other words, the loss of velocity by windage is proportionate to the windage." He does not, however, confirm Dr. Hutton's conclusion that the velocity is directly as the square root of the weight of the powder. "It is obvious," he observes, "that the portion of the charge which acts with the maximum effect on the ball (that is to say, which exerts its force before the ball has been much displaced) will vary with the resistance, or with the density of the ball; this density must, therefore, enter into the expression of the relation between the velocity of the ball and the charge of powder." Another of his conclusions is: "that the use of hay or punk wads is decidedly injurious to the accuracy of fire of cannon; and that when a wad is required to hold the ball in its place, it should be made as light as possible, in the form of a grommet. In small arms, on the other hand, the wad is of great importance for developing the full force of the charge, unless the ball has very little windage, as in the rifle."

Major Mordecai arrived at valuable conclusions concerning the charges for cannon and small arms; the form of the cartridge for heavy guns; and particularly concerning the proof, the hygro-metric test, the mode of manufacture, the size of grain, &c., of gunpowder, to the trial of which his experiments have been particularly directed.—From these scientific investigations we turn to the practice of gunnery, which they are designed to promote and improve; and this we shall consider under the heads of range and penetration. We have already defined the objects of the art of gunnery to be, to direct the shot or shell to a certain point, which, with all its various details of execution, is included under the head of range; and 2, to regulate the force of impact so that the shot or shell will either possess great momentum as in breaching walls, or only sufficient penetrating power to enter and remain fixed in the object, as in exploding shells in a ship's side, which is embraced in penetration.—*Range.* In the text book of the military school at St. Cyr, it is directed that the fire of artillery should cease when the enemy is at 1,000 or 1,200 metres distance; and Col. Piobert, in his *Traité d'artillerie*, prescribes 1,600 or 1,700 metres as the limits of ricochet practice in the field. It has hitherto been usual for opposing bodies in an open engagement to take their stand at about 1,000 yards from each other, more or less according to the nature of the ground and other circumstances. At Waterloo the distance was 1,200 yards, and the armies were out of the reach of all but solid shot from field guns, as they were fitted and served at that time. But the recent changes in fire-arms, especially the introduction of rifles and shell guns, have completely overthrown the old systems. Now troops can shoot each other with their rifles at 2,000 yards; and at the first trial of the Armstrong gun at Shoebury Ness, a shot and a shell were projected by it 5 English miles. But not only is the extent of range wonderfully increased, but so also is the accuracy of aim; or in other words, the deviation or difference of range is diminished. It is stated that at the same trial the Armstrong gun was compared with an ordinary 9-pounder field gun, and that the mean lateral deviation of the former was less than one foot, while that of the latter was over 9 feet. To use the words of the writer: "Armstrong's gun could hit a target 2 feet 6 inches in diameter at 1,000 yards, while the service gun could not be depended upon to hit a haystack at the same distance; at 1,500 yards the aim of the brass gun became wild, while the rifled cannon maintained its relative accuracy up to at least 3,000 yards, and even beyond that." It was the deliberate opinion of the late Gen. Jacob, an old artillery officer, a rifleman, and a practical mechanic, "that a 4-grooved rifle iron gun, of a bore of 4 inches in diameter, weighing not less than 2,400 lbs., could be made to throw a shot 10 miles or more with force and accuracy." If to this possible range of great guns we add the improved range of the Minié or Enfield rifle,

we shall perceive, without further argument, the important bearing of the subject upon naval as well as military warfare. As this article does not aim to be a systematic treatise on naval gunnery, we shall simply say, without assigning reasons for it, that the point-blank range, always preferable, is especially to be relied upon on board ships, and preëminently so where rapid firing is to decide the affair. But Dahlgren's practice at Washington (see "Shells and Shell Guns," by J. A. Dahlgren, commander U. S. N.) has shown that the chances of getting to close quarters are now not so favorable as they were before the invention of his own and other 8-inch and 10-inch shell guns and their missiles. Upon this point we may refer the reader also to table V. of Sir Howard Douglas's "Naval Gunnery," which contains the "ranges with sea-service iron ordnance, single-shot, obtained on board H. M. S. Excellent." Naval guns are now fitted with graduated tangent scales, or scales of elevation, on which are marked either ranges in yards, or elevations in degrees and parts of a degree. The adaptation of them to the guns of our navy was commenced by Commander Dahlgren, under the orders of the naval bureau of ordnance, in 1848; and tables containing the angles of elevation answering to different distances are furnished in the "Ordnance Manual." These tangent scales are made of brass and fitted to the breech of the gun; and the degrees are counted above the line of dispart, or above the line of sight which is parallel to the axis of the piece.—*Penetration.* The inquiry into the injury effected by the new ordnance and missiles, at the distances mentioned by the authors we have referred to, brings us to the subject of penetration. It will be readily understood that the nature of the service to be performed must be taken into account by the gunner; otherwise he may throw away his powder and ball. If, for example, he is superintending the operations of a siege train with which he is to open a passage for troops through the walls of a fortified place, he will consider that the force of the blow depends upon the weight and velocity of the ball, and that the momentum on striking is in proportion to the initial momentum; he will, therefore, make use of solid shot and high charges. If, again, he is directing his fire against ships, within easy range, he will remember that it is not the shot that are projected with such velocity as to pass entirely through a ship that commit the most havoc, but those rather that have just sufficient momentum to penetrate, and tear off the greatest number of splinters. In this case shot of inferior weight, or moving with less velocity, will cause the greatest rents and ravages in timber, will make the largest and most numerous splinters, and will open holes of an irregular shape and very difficult to plug up. If, again, uncovered masses of men are the objects of fire, grape, canister, shells, and shrapnels will be resorted to, the two latter with Col. Bormann's fuse properly set according to

the distance, so that they will explode over or among the enemy. If, again, the contest is between a casemated battery and ships at a short distance, the former having large embrasures, the ships ought to fire canisters of musket balls. "It is difficult to understand how a casemated battery having large embrasures can be served at all, after a ship has gained a position within a short distance, and opened her fire of small canister balls. For the ship to fire grape, or large canister balls, would be to abuse her opportunity, since these larger balls would be no better in any such conflict than the smaller ones, while they would be far less numerous. Musket balls, used as canister shot, would have all the force necessary, and there would be thrown of these, in half an hour, into the casemate, through 24 embrasures of 54 square feet of area each, by 50 82-pounders, no fewer than 88,696, being 1,404 through each embrasure. Were the battery to retort upon the ship with the same missiles, the advantage would still be greatly with the ship, because against the 1,404 balls received by each embrasure, there would be thrown but 126 into each port, and into the 50 ports there would be returned but 6,300 shots against the above number of 88,696 poured into the 24 embrasures." ("Casemate Embrasures," by Brig. Gen. Joseph G. Totten, chief engineer U. S. A.) The experiments upon penetration have been numerous and various in Europe and the United States. Sir Howard Douglas gives a table of penetrations into oak from the *Aide mémoire navale*; Capt. Dahlgren also presents a similar table of experiments upon seasoned white oak; and M. Piolet, in his *Traité d'artillerie*, has given tables professing to contain the results of experiments made in France on the depths of the penetration of shot into masonry, wood, earth, and water, from guns of different calibres, with various charges of powder, and at different distances from the object struck. See also the *Mémoires* of Lieut. Col. Duchemin and M. Poisson in the *Journal de l'école polytechnique*, Nos. 24, 26, 27.—For an account of grooved guns, and of rotating balls, see RIFLE, and RIFLED ORDNANCE.

**GUNNY**, a coarse cloth made in India of the fibres of two species of *corchorus*, and used for the sacks in which saltpetre, pepper, and other articles are packed for exportation. The bagging itself is also exported. The bulk of the Calcutta exports of gunny bags and cloth finds its way to the United States, and is mainly used at the South for cotton bagging. In the year ending June 30, 1858, the amount was as follows:

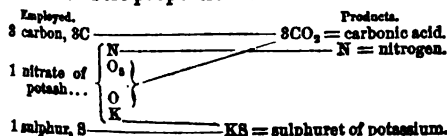
	Gunny bags.	Gunny cloth.
Boston and Charlestown.....	\$302,909	\$805,821
New York.....	23,108	124,468
Charleston.....		60,481
New Orleans.....	57,118	
Philadelphia.....	18,580	18,817
San Francisco.....	16,850	
New Bedford.....	7,784	7,769
Other ports.....	167	....
Total.....	\$420,966	\$1,016,501

About \$100,000 worth of gunny bags and \$16,-

000 worth of cloth were re-exported, chiefly from New York, and principally to Chili and Peru.

**GUNPOWDER**, an explosive compound of nitre, sulphur, and charcoal, differing from the fulminates by being less instantaneous in its action when ignited. It is consequently better adapted for throwing projectiles and shattering rocks in blasting; and to these uses it is appropriated to the exclusion of other explosive preparations. Its composition and character appear to have been known to the Hindoos at a very early period—in the opinion of some versed in their annals, as far back even as the time of Moses; and through the Arabs a knowledge of it is supposed to have been brought from the East to Europe. In the life of Apollonius Tyaneus, written by Philostratus, is a passage referring to some explosive material which was used as a means of defence by the Oxydracæ, a people living between the Hyphasis and Ganges, and whom Alexander is supposed to have declined attacking in consequence: "For they come not out to fight those who attack them, but those holy men, beloved of the gods, overthrow their enemies with tempests and thunderbolts shot from their walls." The Egyptian Hercules and Bacchus, who overran India, were repulsed by these people "with storms of thunderbolts and lightning hurled from above." The invention of gunpowder has been popularly attributed to Schwartz, a German monk and alchemist of the 14th century, and also to Roger Bacon, who described it in his writings about 1270. The latter, however, referred to it as a substance already in common use for the amusement of children. The receipt which he gives for its manufacture is thus translated: "But, yet, take of saltpetre, with pounded charcoal and sulphur, and thus you will make thunder and lightning, if you know how to prepare them." Its early use is further treated in the article **ARTILLERY**. The invention and application of this material, capable of exerting such immense influence in the affairs of nations, cannot but be regarded with admiration, when the selection and combining of its ingredients would seem to have demanded much more chemical skill than belonged to the age in which it was produced. It is also remarkable that so powerful an agent should lie hidden in three substances, all easy to be procured, giving to those nations that possess the skill to combine them a vast superiority over the more ignorant. This result, however, is the more striking in modern times, in the improved methods of applying gunpowder in practice.—The earliest known receipts for making gunpowder combine, according to Dumas, the same ingredients in similar proportions to those now adopted as the best; these are 75 parts of saltpetre, 12.5 of sulphur, and 12.5 of charcoal. The Chinese receipt is not very different. But the proportions recommended by some of the English and French authorities of the 14th century indicate a want of uniformity in making the mixture and an ignorance of the best proportions; all, how-

ever, employ the same three ingredients, the use of which had been transmitted from one age and nation to another. And yet it is known that a more simple preparation, made of saltpetre and charcoal alone, may possess in charges of several ounces as great projecting force as if sulphur were added to it. Such is the result of trials made by Mr. Napier in England; and powerful explosions are known to have occurred, where saltpetre in large quantity and highly heated has become mixed with carbonaceous materials, without the presence of sulphur. Deflagrations are small explosions which take place, when nitre is imperfectly mixed with charcoal or with sulphur and heated to the temperature required for their combination. Violette investigated this subject, and in a course of interesting experiments determined the conditions of temperature, &c., required for this phenomenon to occur with different mixtures, and thus established important principles which are now recognized in the methods adopted of preparing the materials for making gunpowder. Explosion is a deflagration in which the combination of the ingredients is completed at once, the whole, so far as it is capable of this change, passing from a solid into a gaseous condition by the elements of the ingredients entering into new combinations among themselves. The exciting cause may be simply accession of heat sufficient to effect the decomposition of the smallest particles. More heat is thereby immediately generated, and the process goes on, liberating increased quantities of caloric. This, acting upon the gases, causes them to expand to many times their volume under ordinary temperatures. The process is evidently most completely effected when the substances are as wholly converted into gas as is possible, and also into those gaseous combinations which set free the largest amount of caloric. Combinations in equivalent proportions are therefore likely to effect the best results; and the production of carbonic acid is to be sought for instead of carbonic oxide, which arises from incomplete combustion. These gases are combinations of the carbon of the charcoal with the oxygen of the nitrate of potash. Sulphur affords no direct addition to these; but it serves to decompose the potash by combining with its metallic base, and thus sets free another atom of oxygen for producing more carbonic acid. The accession of heat thus engendered also greatly adds to the effect. These changes, supposing them to be fully carried out, may be represented by the following diagram, employing 3 equivalents of carbon, 1 of nitre, and 1 of sulphur, or 13.3 per cent. of carbon, 11.9 per cent. of sulphur, and 74.8 per cent. of nitre, which approximate the best proportions in use:



This interchange of elements should produce an expansion of the original material to 329 times its original bulk at ordinary temperatures; but the effect is commonly reduced by the sulphur uniting in part with oxygen to form sulphuric acid, which combines with a portion of the oxide of potassium, and by the carbon thus finding an insufficient amount of oxygen for its entire conversion into carbonic acid. If the sulphur seems to act injuriously in this respect, experiments prove that its presence is on the whole beneficial, and that it prevents the formation of carbonate of potash, which takes place when nitre and charcoal alone are decomposed. It also increases the rapidity of the chemical action when in due proportions, and adds much to the heat evolved. Greener, in his "Gunnery in 1858," states that without sulphur gunpowder is not so powerful nor so regular in its action, and is poorer and friable, crumbling by friction in transportation to dust; while that made with it is thought to be less susceptible of injury from atmospheric influence. Charcoal, on the contrary, absorbs moisture, and powder is rendered better to keep by reducing its proportion and increasing that of sulphur. The receipts adopted by different governments for the manufacture of the powder they require are somewhat variable, and private establishments produce different mixtures according to the purposes for which the powder is required. Some of these are exhibited in the table below :

Countries.	Sul- phur.	Char- coal.
United States.	75.0	12.5
England, gov't mills, artillery powder.	75.0	10.0
" " " "	75.0	8.0
" " " "	76.0	9.5
" " " "	76.5	9.0
" " " musket	78.0	9.25
" " " "	78.0	8.5
" " " sporting	79.7	7.8
" " " "	78.0	8.5
" " " "	78.0	8.0
Austria, artillery powder.	70.0	16.0
" " " "	76.0	11.0
" " " musket	73.0	16.0
" " " "	75.5	11.8
" " " sporting	80.0	12.0
France, artillery and musket powder.	75.0	12.5
" " " sporting powder.	78.0	10.0
Russia, artillery	71.0	11.5
" " " "	75.0	10.0
" " " musket	80.0	8.7
" " " sporting	80.0	8.0
Prussia, artillery	75.0	11.5
China, " "	61.5	15.5
" " " "	75.7	9.9

For blasting purposes, on the score of greater efficiency as well as of greater cheapness, a powder is preferred of which the saltpetre forms 65, the sulphur 20, and the charcoal 15 per cent. These are almost precisely the proportions which would be given by 1 equivalent of nitrate of potash, 2 of sulphur, and 4 of carbon. This powder, notwithstanding its large proportion of sulphur, is not so quick in its explosion as the other kinds, and is more efficient by allowing time for the shock to be distributed through the rock. Sporting powder applied to this purpose would be more likely to throw



off fragments in contact with the charge with great violence and a loud report, but do little of the real service required. Such powder should be provided for military service to be used when required for exploding mines, instead of the ordinary artillery powder. To further increase the time consumed in exploding, this powder is also made of very coarse grain; and Greener strongly recommends that sporting powder should be made of the same coarseness, as its great propelling force would thereby be exerted with continually renewed effect upon the projectile while this is passing through the bore of the piece. To attempt to secure this advantage by increased proportion of sulphur would be to weaken the powder by involving reduced gaseous expansion, and to risk fouling the piece with injurious sulphurous products, generated directly by union of the sulphur with the potash, or indirectly by the sulphuret of potassium after the discharge absorbing moisture from the air, and thus giving rise to sulphuretted hydrogen and sulphate of potash.

—The materials employed in the manufacture of gunpowder should be selected and prepared with special reference to their purity and best conditions for producing the effect desired. Charcoal, more than the other ingredients, is liable to vary in its character. This is owing as well to the different qualities of the woods from which it may be made, as to the different methods employed for preparing it. Woods which give a hard flinty coal are objectionable on account of the slowness of its combustion, the comparatively small amount of gas it produces, and the deliquescent salts, as carbonate of potash, which it contains. The porous charcoals which contain some hydrogen are much to be preferred; such are those made from the wood of the black dogwood (*Rhamnus frangula*, a species of buckthorn), the alder, and the willow. In France the black alder is exclusively used; and of this the smaller sized branches are preferred. They are stripped of their bark, as this would introduce too much inorganic matter. In England black dogwood is used for sporting powder; willow and alder by the government. In the United States the willow is largely cultivated about powder works, and the plants are kept down to small size by frequent cropping of their rapidly growing shoots. These excellent woods, however, may be rendered as unfit for this manufacture as the hardest coals, if they have been charred at too high a temperature. The experiments of Violette, already referred to, establish the fact that charcoal ignites most readily when the temperature attained in its preparation does not exceed 500°. Such coal enters into combustion when afterward subjected to the temperature of 680° or less; the coal of lighter woods more readily than the harder kinds. When charred at degrees of heat ranging from 536° to 662° it ignites at 698°; and thus the temperature required for igniting increases according to that employed in coaling, till it is found that if the

charcoal has been made at the heat required to melt platinum, it may enter into combustion but slowly even when heated to a point estimated at 2,282°. This takes place with the most combustible kinds of charcoal. It thus appears that the most inflammable powder must be made with charcoal carefully prepared at a moderate heat; and that the thoroughly carbonized black coal, that has been subjected to higher temperatures, is better adapted for blasting and artillery powder than for rifle use. Whether the carbonization be effected in pits or retorts, it requires greater care to regulate the process than when charcoal is made for other uses. The retorts, of cast iron, when charged, are heated to redness. Being of cylindrical form, the powder from charcoal prepared in them is called in England cylinder gunpowder. The crude nitre employed in the manufacture requires to be purified in order to separate the deliquescent chlorides of sodium and of potassium and other impurities which are always present. It is dissolved in water, the solution is strained, and then concentrated by evaporation, when the chlorides first separate and are removed before the nitrate of potash crystallizes. The crystals when formed are taken out and redissolved in pure water and again refined. The sulphur is refined by fusing the rolls, when the lime and sulphuret of calcium present subside, and other impurities are skimmed off. If the flowers of sulphur are used, they should be washed with water in case of sulphuric acid being present. The melted sulphur after refining must be ground to impalpable powder and bolted. The nitre and the charcoal are also treated in the same way, the mills employed sometimes being the same as that for the next process. The ingredients are then carefully weighed and sifted into a trough or a cylinder especially contrived with revolving fans, in which they are mixed together. The compound is then taken to the powder mill to be thoroughly incorporated together. This mill is on the same plan as the Ohilian mill, used for grinding gold ores. Two rollers of cast iron, weighing about 3 tons each, are made to revolve around a vertical shaft upon a cast iron bed, which is surrounded with wooden sides, set up of staves like the sides of a tub. It is in a small building by itself, on account of risk of explosion. The operations at powder works are for this reason distributed as much as possible in numbers of isolated buildings, and upon some stream which supplies water power at numerous points. The quantity of powder introduced into the mill to be ground at once is from 40 to 50 lbs. It is kept slightly moistened with water to prevent its forming dust, while it is subjected to the grinding of the heavy wheels rolling and twisting round for 3 to 5 hours. The greatest care must be taken that no gritty substances enter the mill. The grinding completed, the mixture is cautiously taken out of the mill. In drying, it cakes together in hard lumps of a grayish black hue, which are called mill cake. It may now be broken up between grooved

rollers, or introduced directly into the press, and subjected between copper plates to a hydraulic pressure of about 120 tons to the square foot. A screw press is objectionable from the danger of the powder dust floating about being ignited in the screw. The mixture comes out of the press in flat blackish sheets like slates about  $\frac{1}{4}$  inch thick. By this operation the powder is rendered dense and firm, and when afterward reduced to granular form it is thereby more efficient, and also less disposed to absorb moisture and to be rubbed to dust by friction in transport. Mealy powder explodes with comparatively little force, and the mill cake when ignited may be said rather to burn furiously than to explode. The powder must be reduced to grains to produce the effect required; and this is done by the process called granulating. The press cakes are first broken up by wooden mallets, or between pairs of rollers, toothed or plain, revolving near together, and the fragments are then received in sieves made of vellum pierced with holes  $\frac{1}{4}$  of an inch in diameter, and moved forward and back by machinery. Two disks of lignum vitæ, 2 inches or more in thickness, and 6 inches in diameter, are placed in each sieve to rub and grind the powder, and cause it to work through. The powder is then assorted by means of wire sieves of different grades. The dust separated by a sort of bolting is returned to the press. In some works the machinery is arranged to complete this process without exposing the workmen to the danger of attending it. The edges of the grains must next be worn off, to lessen the tendency to the production of dust in the casks by friction. This process, called glazing, is effected upon parcels of 200 lbs. placed in a barrel, which is made to revolve for some hours at the rate of about 40 revolutions a minute. To give a real glazing or polish, as is done to some kinds of sporting powder, the cylinders are lined with woollen. Greener condemns the whole process as unnecessary, and "injurious to the quick and certain ignition." After the glazing the gunpowder is dried at a temperature of about  $140^{\circ}$ , produced by steam pipes or heated air. It is finally sifted, and is then ready to be packed in casks, kegs, or canisters. The use of nails is carefully avoided in securing casks and kegs. The hoops should be of wood, or if, as practised in England, of copper, the rivets should be forged and not cast, several accidental explosions having occurred from the fine sand attached to the copper cast in moulds.—The quality of gunpowder is judged of by its uniformity of texture, its firmness and cleanliness, by its not being easily crushed in the fingers, nor readily soiling them. A sample of it flashed upon white paper should blacken this but little, and not inflame it. The appearance of sparks indicates imperfect incorporation of the ingredients. Its degree of inflammability should be observed, that the powder be sufficiently and not too quick for the purpose required; though there is no danger of powder

made with nitre acquiring the highly explosive character of the fulminates. The quickest kind, laid in a train and crossed at right angles by another of fulminating mercury and fired at one end, may flash off till the fire reaches the fulminate and explodes this, when its further progress is arrested, the grains of gunpowder being scattered before they can be heated to the point of ignition. Gun cotton may be fired upon or even under gunpowder without this being ignited. In examining powder, in case the grains adhere together, the powder is known to have absorbed moisture, perhaps enough to materially injure it, so that even drying will not restore it. The effect of the moisture is upon the nitre, dissolving it and separating it from that intimate mixture with the other ingredients, upon which the value of powder depends. Even if apparently restored by drying, the powder is not so strong as before, and is more likely to become dusty by the friction incurred in transporting it. A partial analysis is frequently adopted to determine the quality of the powder. The moisture, commonly a mere trace, is ascertained by drying a weighed sample at a temperature of  $212^{\circ}$  and again weighing. The nitre is next dissolved out, either by boiling the powder in distilled water, or washing it (placed in a filter) with hot water. The solution, separated from the insoluble portion, may be evaporated to dryness, and thus the nitre is separated, and may be subjected to the usual tests to determine the presence of chlorides, which may have been introduced by original impurity of the nitre or by the powder having been damaged by sea water. The strength of powder is tested by the effect of weighed portions upon heavy projectiles discharged from pieces made for this use, and called *eprouvettes*; or in some *eprouvettes* the force is measured by the compression of strong springs, against which it is exerted.—A highly inflammable and powerful gunpowder may be made by mixing 2 parts of chlorate of potassa with one of white sugar and one of ferrocyanide of potassium, the ingredients being first separately pulverized. The powder, when granulated in the usual way, is in white grains. It has the advantage of not absorbing moisture from the air, so that it may be kept without incurring damage; it can also be readily made on a large or small scale; and the materials being of fixed composition, its strength is likely to be uniform. If care be taken that no charcoal or sulphur is introduced into the mixture, there is no greater danger attending its use than that of ordinary gunpowder. It is liable, however, to oxidize iron barrels rapidly, and is therefore fit only for bronze pieces or for hollow projectiles.—In 1856 Great Britain exported 10,500,018 lbs. of gunpowder, valued at about \$1,600,000, chiefly to the W. coast of Africa, Australia, South America, British North America, and British East Indies. The exports from the United States in the year ending June 30, 1858, amounted to 2,778,414 lbs., valued at \$865,173. The man-

ufacture of gunpowder in the United States is chiefly carried on in Delaware, New York, and Massachusetts. In 1858 New York produced 2,320,000 lbs., and Massachusetts 2,240,000 lbs.

GUNTER, EDMUND, an English mathematician, born in Hertfordshire about 1581, died in London, Dec. 10, 1626. He was educated at Westminster school and at Christchurch college, Oxford, where he gave his attention principally to mathematics, and in 1606 invented the sector, the description of which was written by him in Latin, and disseminated in manuscript. Subsequently he took orders; but his tastes being altogether mathematical, he procured in 1619 the professorship of astronomy in Gresham college, which he filled until his death. His works, consisting of the *Canon Triangulorum*, "The Sector and Cross Staff," &c., have been several times printed in a collective form, the best edition being that of 1673 (4to., London). His inventive faculty was very usefully exercised in the production of the chain, the logarithmic line, the quadrant, and the scale bearing his name, of which descriptions are subjoined.—GUNTER'S CHAIN, the chain most commonly employed in land surveying, is 66 feet or 4 rods in length, and is divided into 100 links, which are connected with each other by 1, 2, or 3 rings. The length of each link, together with half the length of the rings connecting it with the adjoining links, is 7.92 inches; every 10th link is marked by a tally of brass, for convenience in measuring, and part of the first link at each end is formed into a large ring for the purpose of holding it with the hand. Ten square chains, or 100,000 square links, make one acre.—GUNTER'S LINE, a logarithmic line, sometimes termed the line of lines or line of numbers, and usually graduated upon scales, sectors, &c., consists simply of logarithms graduated upon a ruler, thus serving to solve problems instrumentally, as logarithms do arithmetically. It is generally divided into 100 parts, every 10th division being numbered from 1 to 10. By means of this line the following problems can be solved: 1. To find the product of two numbers: the space between division 1 and the multiplier is equal to the space between the multiplicand and product, the distance in each case being laid off in the same direction. 2. To divide one number by another: the extent from the divisor to unity equals that from the dividend to the quotient. 3. To find a 4th proportional to 3 given numbers: the space between the first 2 numbers equals the distance from the 3d number to the required 4th proportional. 4. To find a mean proportional between any 2 given numbers: one half the distance between the lesser number in the left hand part of the line, and the greater number in the right hand part, will extend to the mean proportional sought, if applied forward from the lesser number, or backward from the greater. 5. To extract the square root of a number: one half of the distance between unity and the given number, if laid off from unity, will give the

point representing the desired root. Similarly, the cube root or that of any higher power can be found, by dividing the distance between unity and the given number by the index of the root, the quotient giving the distance between unity and the point representing the root required.—GUNTER'S QUADRANT is a quadrant usually made of wood or brass, and containing a kind of stereographic projection on the plane of the equinoctial, the eye being supposed in one of the poles. The tropic, ecliptic, and horizon form arcs of circles, but the hour circles are curves, delineated by means of several altitudes of the sun for some particular latitude every year. It can be used for the determination of time, the sun's azimuth, &c., and also for taking altitudes of any object in degrees.—GUNTER'S SCALE, generally termed by seamen the Gunter, is a large plain scale, generally 2 feet long by about 1½ inches broad, and used in solving problems in navigation, trigonometry, &c. On one side of the scale are natural lines, and on the other the artificial or logarithmic ones; the former side contains a scale of inches and tenths, two plain diagonal scales, and various lines relating to trigonometry as performed by natural numbers, and marked as follows: "Rhumb," the rhumbs, or points of the compass; "Chord," the line of chords; "Sine," the line of sines; "Tang." the tangents; "S. T.," the semi-tangents; "Leag.," leagues or equal parts; "Rhumb," a second line of rhumbs; "M. L.," miles of longitude; "Chord," a second line of chords; also two lines of equal parts, marked "L." and "P." The latter side contains the logarithmic lines, as follows: "S. R.," the sine rhumbs; "T. R.," the tangent rhumbs; "Numb." line of numbers; "Sin.," sines; "V. S.," the versed sines; "Tang.," the tangents; "Mer.," meridional parts; and "E. P.," equal parts.

GÜNTHER, ARNOLD, a German philosopher and theologian, born in Lindenau, Bohemia, in 1785. He studied philosophy and law at the university of Prague, and, after passing several years as tutor in a princely family, devoted himself to theology at the college of Raab in Hungary, and was in 1820 ordained as priest. Having a retiring pension from his former situation of teacher, he went to Vienna, where he has since followed literature and science, and acted as vice-director of philosophical studies at the university, and for some time also as imperial censor of books. Günther gained reputation as a philosophical writer by his attacks on Hegel and Herbart, and still more by his endeavors to reconcile the Catholic dogmas with the results of speculation. His modernized speculative Catholicism took the shape of a new theological system, which found numerous disciples in Austria and Prussia, and finally attracted not only the attention, but also the hostility of the Jesuits. Oited to appear at Rome, Günther was prevented by illness from obeying, but quietly submitted to the condemnation of his books, which was passed Feb. 20, 1857. His principal works are: *Vorschule zur speculation Theolo-*

ie (Vienna, 1828-'46); *Peregrinus Gastmahl* (1830); *Thomas à Scrupulis* (1835); *Die Juste-filiens in der deutschen Philosophie gegenwärtiger Zeit* (1838); *Der letzte Symboliker* (1844); and *Grundriss der Metaphysik für Vorlesungen* (1848).

GUNTOOR, a collectorate of the Madras presidency, British India, bounded by the river Kistna, the bay of Bengal, Nellore, the collectorate of Cuddapah, and the territory of the Nizam; area, 4,752 sq. m.; pop. 570,089. The surface is generally level, and the climate healthy. The principal productions are chorum, rice, bajra, oil seeds, turmeric, onions, capsicum, betel, tobacco, cotton, and cattle. Guntour forms part of that maritime tract called the Five Northern Circars. It was ceded to the British in 1788. Capital, Guntour.

GURNARD, an acanthopterous fish belonging to the family of *sclerogenidae* or "mailed cheeks," characterized by a prolongation of the suborbital bones forward across the cheek, and immovably articulated behind with the preoperculum; the muzzle is also formed by a firm union of the frontal and other bones; and all these parts present a hard granulated appearance, often armed with spines. The gurnards belong to the genera *trigla* (Linn.) and *prionotus* (Cuv.), the latter being peculiar to America. In the genus *trigla*, in addition to the family characters, the body is scaly; there are two dorsal fins, the first spinous, the second flexible; the pectorals are moderate, and beneath them and at the base are 8 detached articulated rays on each side; branchiostegal rays 7; head of a parallelopiped form; teeth small and villiform on the jaws and pharyngeals; lateral line straight to the caudal, where it forks, variously armed with spiny scales. The gray gurnard or grunter (*T. gurnardus*, Linn.) grows to a length of 15 to 20 inches, and rarely to 2 feet; the body is more elongated and the snout longer than in most other species; the descending line of the profile is nearly straight; the snout is shovel-shaped, slightly emarginated, having on the top 8 hard bony points; the head and shoulders granulated, and armed with spines; lateral line sharply serrated, and the dorsal scales rough. The color above is gray clouded with brown, more or less spotted with black and yellowish white; below silvery. It is common on the English coasts, and is found from Norway to the Mediterranean; it keeps near the bottom, and feeds on crustaceans and mollusks, spawning in May and June; when taken from the water it makes a kind of grunting sound (whence one of its common names), which cannot proceed from the air bladder, as this has no duct communicating externally. Notwithstanding its hideous appearance, its flesh is white, firm, and wholesome; it is caught in deep water, biting at almost every thing, even a red rag. The habits of this fish are easily studied in the aquarium; they may be seen with their pectorals close to the sides, and with no motion of the tail, crawling along the bottom by means of the free pectoral

rays, which are placed successively on the ground like so many feet; their light weight, rendered less by their capacious air bladder, is thus moved with considerable rapidity forward, backward, or sideways in search of food. There are impressions on sandstones symmetrically arranged, with a vacant space between them, which may possibly be explained by the passage over them of some gurnard-like fishes. These free rays are moved by a muscular apparatus independent of that supplying the common fin; to these rays are also distributed large nervous filaments, arising from a marked expansion of the upper part of the spinal cord, indicating that these organs are endowed with a delicate sense of touch; this fish stirs up the mud and sand with its shovel-shaped nose, and is enabled to detect its prey in the turbid water by means of these pectoral feelers. The large eyes, on the top of the head so as to catch all the rays of light, indicate an animal organized for living in comparative darkness. The red gurnard (*T. cuculus*, Bloch), growing from 9 to 15 inches long, is of a red color, with a black spot on the 1st dorsal, which fin has the 1st 8 rays smooth and without granulations; it is found on the W. coast of Europe from the North sea to the Mediterranean. The streaked gurnard (*T. lineata*, Linn.), about a foot long, has transverse lines encircling the body. Other European species are the *T. pint* (Bl.), the common *rouget* of the French; the sapphirine gurnard (*T. hirundo*, Bl.); and the piper (*T. lyra*, Linn.). There are 2 others in the Mediterranean, and 7 or 8 in Asia and its archipelago.—The American gurnards of the genus *prionotus* are distinguished from those of the preceding genus by the larger pectoral fins, and by the villiform teeth on the palate bones. The banded gurnard (*P. lineatus*, Mitch.) grows to a length of 12 to 18 inches; it is of a reddish brown color above, covered with numerous black dots, and the abdomen white; the color of the dead fish above the lateral line is slaty, and beneath there are several brownish bands, whence its name; the head is covered with bony plates, rough, and armed with spines; the upper jaw the longer. It is found on the coast of Massachusetts and the middle states; though rarely eaten, its flesh is no doubt as good as that of its European congeners; it is called also grunter and sea robin. The web-fingered gurnard (*P. carolinus*, Linn.), a much rarer species, grows to the length of about 18 inches, and may be known by the dilated ends of the pectoral processes; the color is reddish brown above, with irregular darker shadings, and nearly white below. When alarmed, they bury themselves in the sand by a rapid lateral movement of the body, leaving only the eyes and the top of the head exposed; the flesh is occasionally eaten; their food consists principally of crustaceans. This species is found from Massachusetts as far south as the Carolinas, and perhaps further. The spotted gurnard (*P. punctatus*, Cuv. and Val.), about a foot long, is found from the West Indies as far as Brazil,

in small troops; it has two small spines on each side of the snout. A few other species are described.

GURNEY, JOSEPH JOHN, an English philanthropist, born at Earlsam hall, near Norwich, Aug. 2, 1788, died there, Jan. 4, 1847. He completed his education under a private tutor at Oxford, where he studied Hebrew and Syriac, as well as Greek, Latin, and mathematics. In 1818 he became recognized as a minister of the society of Friends, and soon acquired celebrity as a preacher. In 1827 he made a tour of Ireland in company with his sister Mrs. Fry, to investigate the state of the prisons in that country, and afterward addressed a report of the result to the lord lieutenant of Ireland. In 1837 he visited the United States and Canada, and in 1841 and the 3 following years he travelled with Mrs. Fry through most of the central European countries, inquiring everywhere into the nature of their prison discipline, and inciting their governments to amend it. Mr. Gurney was a man of large benevolence, and a member of various charitable and reformatory associations. He left a number of works, the principal of which are: "Notes on Prison Discipline" (12mo., London, 1819); "Observations on the Religious Peculiarities of the Society of Friends" (8vo., 1824); "Essays on the Evidences, Doctrines, and Practical Operations of Christianity" (8vo., 1827); "Biblical Notes to confirm the Deity of Christ" (8vo., 1830); "Accordance of Geological Discovery with Natural and Revealed Religion" (12mo., 1835); "Sabbatical Verses" (8vo., 1837); "Familiar Sketch of William Wilberforce" (18mo., 1840); "A Winter in the West Indies, described in Familiar Letters to Henry Clay of Kentucky" (8vo., 1840); "Thoughts on Habit and Discipline" (2d ed., 1844).

GUROWSKI, ADAM DE, count, a Polish publicist, born on the hereditary estates of his family, in the palatinate of Kalisz, Sept. 10, 1805. He is the eldest son of Count Ladislav Gurowski, a nobleman of ancient descent and great property, who took part in the insurrection of Kosciuszko in 1794, and lost most of his estates in consequence. Count Adam was even as a school boy noted for patriotism, and in 1818 and again in 1819 was expelled from the gymnasia of Warsaw and of Kalisz by order of the grand duke Constantine for singing patriotic songs and wearing the then prohibited national costume of Poland. In 1820 he went to Berlin, and studied in various German universities till 1825. Returning to Poland, he was conspicuous among the opposition to Russian influence, for which he was several times imprisoned by Constantine. He was one of the principal projectors of the insurrection of 1830-'31, fought as a volunteer in the first campaign in January and February, and in March was sent to Paris as an agent of the republicans of Poland to confer with Lafayette and the French republican leaders. On the suppression of the insurrection he was condemned to death, and his estates were confis-

cated. He remained in Paris 5 years, during which time he was much associated with the St. Simonians, and became acquainted with Charles Fourier, many of whose views he adopted. In 1835 he published a work entitled *La Vérité sur la Russie*, advocating the idea of Panislavism, which attracted the attention and favor of the czar Nicholas, who pardoned the author, and recalled him to Russia in 1836. After his return Gurowski was employed in the prince chancery of the emperor, and afterward in the department of public instruction, where he suggested and introduced various measures tending to Russianize Poland by means of schools and other public institutions. His peculiarities of temper and disposition made him many powerful enemies at the imperial court; and as his resignation of his office was not accepted by the emperor, he secretly fled from St. Petersburg in 1844, and went to Berlin and from thence to Heidelberg and Munich. While in Germany he pursued his studies with ardor, and devoted himself especially to historical investigations. For two years he lectured on political economy at the university of Bern, Switzerland. He visited Italy, and came, in Nov. 1849, to the United States, which he has since made his home, and of which he has become a naturalized citizen. Beside "The Truth about Russia," Count Gurowski published while in Europe, *La civilisation et la Russie* (St. Petersburg, 1840); *Panais sur l'avenir de la Pologne* (Berlin, 1841); *Au meinem Gedankenbuche* (Breslau, 1843); *Eine Tour durch Belgien* (Heidelberg, 1845); *Impressions et souvenirs* (Lausanne, 1846); *Die letzten Ereignisse in den drei Theilen des alten Polen* (Munich, 1846); and *Le Panislavisme* (Florence, 1848). Since his residence in the United States he has published in English, "Russia as It Is" (New York, 1854), and "America and Europe" (New York, 1857).

GURWHAL, GURHWAL, GURWAL, or GARWHAL, a state of N. W. Hindostan, under British protection, between lat. 30° 2' and 31° 20' N. and long. 77° 55' and 79° 20' E.; bounded N. and N. E. by the Himalayas, which separate it from Thibet, E. and S. E. by Kumaon, S. by the Dehra Doon, and W. by Bussaher; length from N. to S. 95 m., breadth 70 m.; area, 4,500 sq. m.; pop. estimated at 100,000. It occupies the S. W. slope of the Himalayas, and includes some of the loftiest peaks of that range, many over 20,000 feet high, covered with perpetual snow and the cradle of vast glaciers. Its surface presents little else than a succession of mountains and deep narrow valleys, among which rise several head streams of the Ganges. Only a small part of the country is cultivated or inhabited. Many of the hills are totally destitute of vegetation, and others are covered with low forests. The oak, pine, holly, horse chestnut, yew, elm, walnut, maple, and hazel occur in the upper forest region. The chief crop in the low regions is rice. Wheat, barley, buckwheat, battu or amaranthus, pulse of various kinds, oil seeds, the poppy, cotton, sugar cane,

and tea are also cultivated. The last mentioned article grows readily and brings a high price. The system and implements of agriculture are of the most primitive description. Field labor is performed by women. Horses are rare, asses are unknown, but cattle, sheep, and goats are carefully reared. The inhabitants are mainly Hindoos,  $\frac{1}{2}$  belonging to the Khasiyan tribe, and the remainder being of Thibetan or of mixed Thibetan and Hindoo origin. They are below the middle size, have dark hair and beards, and a lighter complexion than the Hindoos of the plains. Bows and arrows are their weapons. They lead peaceful, inactive lives, obeying no fixed laws, and having little respect for any authority. Some travellers represent them as incorrigible robbers. Their houses are built of layers of stone and squared beams, and are usually 8 stories high, the ground floor being occupied by the cattle, the 2d being used as a granary, and the family living in the 8d.—Gurwal was dependent on some of the more powerful hill states until the reign of Mohiput Shah, who declared himself independent and built Serinagur for his capital. Under the sovereigns of this dynasty the state embraced, beside its present territory, the fertile district of the Dehra Doon, and about one half of Kumaon. In 1803 it was overrun and devastated by the Gorkhas, and in 1814 was wrested from the conquerors by the British and restored to the family of the former rajah; but Dehra Doon and the portion now included in Kumaon were reserved by the East India company.

GURWOOD, JOHN, an English officer, chiefly distinguished as the editor of the "Wellington Despatches," born in 1791, died by his own hand in Brighton, Dec. 25, 1845. He entered the British army as ensign in 1808. At the storming of Ciudad Rodrigo, in 1812, he led the forlorn hope, and received the sword of the governor on the surrender of the fortress. This incident involved him many years after in a very unpleasant controversy with Napier, the historian of the peninsular war. He served throughout the whole of that war, was present at Waterloo, and was severely wounded there. In 1831 he became private secretary to the duke of Wellington, and in 1841 was raised to the rank of colonel. In 1834 he commenced the publication of "The Despatches of Field Marshal the Duke of Wellington during his various Campaigns in India, Denmark, Portugal, Spain, the Low Countries, and France, from 1799 to 1818," which extended to 13 vols. 8vo. This work met with a reception as unexpected as it was unexampled. The 1st edition was almost immediately sold off, and a 2d edition called for, while an abridgment was issued for the use of those who could not afford to purchase the entire series. In return for his services Col. Gurwood received from the duke the appointment of deputy governor of the tower of London. He afterward visited Spain with the earl of St. Germain (then Lord Eliot), to endeavor to mitigate the ferocity of warfare

between the Carlists and the troops of Queen Christina, and was partially successful in his mission. He committed suicide while under a temporary fit of insanity, brought on by the effects of a wound in the head which he had received at the storming of Ciudad Rodrigo.

GUSTAVUS I., known as GUSTAVUS VASA, king of Sweden, born at the castle of Lindholm in Roslagen, May 12, 1496, died in Stockholm, Sept. 29, 1560. He was the son of Eric Johansson, a Swedish senator of the noble house of Vasa, and before his accession to the throne bore the surname of Ericsson. Both his parents were descendants of the ancient kings of Sweden. After having studied at the university of Upsal he entered the service of the regent Sturé in 1514, at a period of intense civil commotion. Sweden, which by the compact of Calmar in 1397 became a dependency of Denmark, had declared her independence; but the nobility and clergy were much divided, and the young Gustavus was soon called on to bear arms with his patron against the archbishop Trollé, the leader of the Danish party. In 1517 a Danish army was sent to the archbishop's assistance; but the Swedes defeated it, and Gustavus distinguished himself in the battle. In the following year King Christian II. of Denmark took the field in person. After the Swedish victory of Brännkyrka, Gustavus and 5 other nobles were given up as hostages for the king's safety during a proposed interview with the regent; but having got them in his power, Christian carried them in chains to Copenhagen. After a year's detention Gustavus escaped, and spent 8 months in Lübeck. While there he heard of the regent's defeat and death in battle, and the subjugation by the Danes of all Sweden, except the fortresses of Calmar and Stockholm. Bent upon the liberation of his country, he hastened to Calmar; but the garrison, composed of foreign mercenaries, had resolved to surrender, and he narrowly escaped from them with life. He then visited some of the southern provinces, and endeavored to rouse the peasants, but met with only threats and insults, and was many times in danger of being taken. Meanwhile Christian had been acknowledged by the Swedes, and was crowned at Stockholm, Nov. 5, 1520. Three days afterward he caused a frightful massacre of the nobles and populace, the father of Gustavus being among the victims. A price was set on young Ericsson's head, and death was threatened to whoever should assist him. Disguised in rags, Gustavus worked for some time, according to tradition, as a miner and woodcutter in Dalecarlia, owing his life more than once to the kindness of women, until, deeming the time ripe for his enterprise, he threw off concealment, and harangued the inhabitants of Rättwick and Mora in the interior of Dalecarlia. His remarkable eloquence, the sturdy patriotism of the Dalesmen, and their hatred for the tyrannical Christian, soon awakened the spirit of independence; 600 men took up arms and proclaimed him "lord and chief

tain of the realm;" and in Feb. 1521, he made himself master of the Danish garrison of Kopperberg, where he found considerable treasure. This first success brought many recruits to his standard. The people of the coasts declared in his favor; the insurrection spread with great rapidity, and having defeated the Danes in the pitched battle of Westerås, April 29, and taken several fortresses, he called an assembly of the states at Wadstena in August, and received from the deputies an offer of the crown, which he refused for the less ambitious title of administrator. His success from this time was almost uninterrupted. The Danes were driven from one part of the kingdom after another, and Gustavus was soon acknowledged by most of the nobles and people. Christian threatened him with the death of his mother and two sisters, who were held prisoners at Copenhagen, if he did not disperse his followers; Gustavus refused, and the threat was carried into execution. At length Christian was deposed by his Danish subjects (April 20, 1523), and his partisans in Sweden gave in their adhesion to Vasa, who accepted the title of king at the diet of Strängnäs, June 7, and entered Stockholm in triumph two weeks afterward. While at Lübeck Gustavus had listened to Martin Luther; he had since corresponded with the reformer, and although he durst not begin his reign with an open profession of the new doctrines, his first measures were directed against the power and privileges of the Roman Catholic clergy. Several insurrections were thus excited, which were easily put down. In 1527, at a meeting of the states at Westerås, the king obtained, by threatening to abdicate in case his demand was refused, the exclusion of bishops from the senate and their formal subjection to the civil power. The ceremony of coronation, which he had deferred until now, rather than take the customary oath to support the church, was performed at Upsal, Jan. 12, 1528, by the Lutheran archbishop Lars Petri. The reformation now made rapid progress in Sweden; most of the property of the clergy was confiscated, priests were appointed and deposed by the crown, the king assumed supreme ecclesiastical authority, and at a national council held at Örebro in 1528 Lutheranism was adopted as the state religion. In this work the king was assisted by the brothers Olaus and Lars Petri, the former of whom he had made pastor of Stockholm. Having thus, as he said, "conquered his kingdom a second time," he formed an alliance with Frederic I. of Denmark against the deposed Christian II., who, having secured the assistance of the emperor Charles V., entered Norway with an army in 1531, and was joined by Trollé, the deposed archbishop of Upsal, and a number of Swedish malcontents. The troops of Gustavus and Frederic soon forced him to surrender, and the ex-king passed the rest of his life in confinement. In 1535 Gustavus entered into a league with Christian III., the successor of Frederic, against the Lübeckers, and during the war was

freed from his old enemy Trollé, who was mortally wounded in battle. Meanwhile the domestic affairs of the kingdom called for his attention. The exactions of the nobles aroused an insurrection of the peasants (1537), who declared their intention "to destroy the nobility, root and branch." In 1542 the rising became general under the lead of one Nils Dacke, an escaped criminal, who was able at times to take the field with 10,000 men. Avoiding a pitched battle, and encouraged by the count palatine Frederic, who gave him a patent of nobility, by the emperor Charles V., and by the duke of Mecklenburg, Dacke held his ground until 1543, when an arrow put an end to his life, and his followers were dispersed. The disorders caused by the imprudence of the Lutheran pastors were checked, and Gustavus, having at last secured peace at home and abroad, and caused the crown to be declared hereditary in his family, devoted himself to administrative reform, particularly of the finances, to the promotion of agriculture, manufactures, mining and commerce, the construction of roads and canals, the organization of the army, and the creation of a navy. In 1555 a war broke out with Russia, and was continued with varying success until the peace of Moscow, April 2, 1557. The last years of the king's life were embittered by domestic troubles, arising chiefly from the evil propensities of his son Eric. Gustavus was thrice married, first to Catharine of Saxe-Lauenburg, the mother of his son and successor Eric; secondly to Margaret de Laholm, the daughter of a Swedish noble; and thirdly to Catharine Stanbock, niece to the preceding queen. His moral character, if we except a taint of covetousness and an arbitrary disposition, deserves warm admiration. He possessed great natural gifts of body and mind, and was highly accomplished.

GUSTAVUS II., ADOLPHUS, surnamed the Great, king of Sweden, 6th of the line of Vasa, son of Charles IX. and Christina of Schleswig-Holstein, born in Stockholm, Dec. 9, 1594, killed at Lützen, Nov. 16, 1632. His father was the youngest son of Gustavus Vasa, and had been called to the throne on the exclusion of his nephew Sigismund, king of Poland, who was the rightful heir, but had given umbrage to the states by professing the Roman Catholic religion. Sigismund made an alliance with Russia for the recovery of the Swedish crown, and Gustavus Adolphus, on the death of his father, Nov. 8, 1611, inherited a war with the Poles and Russians, beside a long standing hostility with the Danes. Securing the assistance of his nobles by confirming their privileges, he made a peace with Denmark on rather favorable terms, and then turning his arms against the Russians, drove them from Ingria, Karelia, and part of Livonia, while his admirals defeated them on the Baltic. Wisely rejecting the advice of one of his generals to usurp the crown of Russia, he made a treaty with the czar at Stolbova in 1617, by which he retained much of the conquered

territory, and was then in a condition to prosecute the Polish war with greater advantage. He overran the Baltic coast from Riga to Dantzic, made himself master of a large part of Polish Prussia, defeated the Poles in several engagements, but was repulsed and wounded before Dantzic, and on Sept. 30, 1627, fought a bloody battle which was undecisive. The emperor Ferdinand II. now took part in the contest, placed Gustavus under the ban of the empire, and sent 10,000 men under Wallenstein into Pomerania. The Swedes, however, continued victorious, and by the mediation of France and England a truce for 6 years was concluded, Sept. 15, 1629, on terms highly favorable to Gustavus. Meanwhile the expense of the war had raised several seditions at home, which the king put down by alternate mildness and severity. Leaving the care of his kingdom to the chancellor Oxenstiern, he now turned his attention to fresh foreign conquests. The growing power of Austria on the Baltic, the affront put upon him by Ferdinand in the late war, and the danger that threatened the Protestant cause in the great religious contest which then divided Germany, joined no doubt to an ambition to raise his country to a more commanding place in the political system of Europe, induced him to declare war against the emperor; and having presented to the states assembled at Stockholm his daughter Christina as the heiress of his throne, he set sail from Elfsnabben with about 20,000 men, and landed at the mouth of the Oder, June 24, 1630. By July 10 he had seized Stettin, Damm, Stargard, and almost the whole of Pomerania. He levied a heavy contribution in this province, disciplined his troops, taught them a new system of tactics, which gave him an immense advantage over the imperialists, and then, having received an accession of 6 Scottish regiments under the duke of Hamilton, led a division of his army into Mecklenburg. Ferdinand, who at first looked with contemptuous indifference upon the movements of this "king of snow," now awoke to his danger, and proposed a truce on terms exceedingly favorable to the Swedes; but Gustavus preferred to follow up his successes, and in 8 months from the time of his landing he had taken no fewer than 80 fortresses. The imperialists under Tilly and Pappenheim gained several successes, but many of the Austrian magazines fell into the hands of the Swedes; and Gustavus, having first carried Frankfurt-on-the-Oder by assault, pushed on toward Magdeburg, which Tilly was then investing. Before he could reach it, however, the city was stormed, and more than 20,000 of the inhabitants were barbarously massacred. In Sept. 1631, Gustavus was joined by the elector of Saxony, with whom he at once gave battle to Tilly, and defeated him at Breitenfeld, near Leipzig, Sept. 7. This signal victory over a general never vanquished before, which displayed the superiority of the king's mode of fighting, based on boldness of attack and celerity of movement, at once established his repu-

tation as a warrior. The Protestant states, which at first had hesitated whether to regard him as a usurper or a saviour, now hailed him as their leader; and the populace, delighted with his justice, his clemency, and the orderly conduct of his troops, received him with an enthusiasm little short of adoration. The elector of Saxony carried the war into Bohemia, while Gustavus marched into Franconia and the Palatinate, defeated Tilly again at Würzburg, and wintered at Mentz, where his queen and the chief officers of his court joined him. Oxenstiern would have had him attack Vienna, but Gustavus, anxious to appear not as a conqueror, but as the liberator of the Protestants, had resolved to confine the operations of his armies to the N. and W. provinces, where his aid could be the most effective. Ferdinand now determined to recall his famous general Wallenstein, who had been dismissed about the time of the Swede's landing; but before he could obey the summons Gustavus had attacked the Austrians at the river Lech (April 10, 1632), and driven them into Ingoldstadt. The veteran Tilly was mortally wounded in the action. Munich surrendered to the Swedes in May; almost the whole of Bavaria was in their hands, and the elector was forced to take refuge in Ratisbon. The Lutheran peasants of Upper Austria took up arms; the Swiss granted permission to the king to raise levies in their territory, and the Swedish standard was carried triumphantly by Bernhard of Saxe-Weimar to Lake Constance and the Tyrolean mountains. At this juncture Wallenstein, clothed with almost imperial powers, appeared at the head of 40,000 men, drove the Saxons from Bohemia, entered Prague, May 4, effected a junction with the elector of Bavaria at Eger, June 11, and thence advanced toward Nuremberg, where he found Gustavus intrenched. The hostile armies remained in sight of each other for 8 months, each endeavoring to conquer by famine and disease. At last Gustavus, having made an unsuccessful attempt to storm the position of the enemy, retired toward the upper Danube, and in November entered Saxony, where Wallenstein was spreading carnage and desolation. On the 15th he found himself face to face with the enemy at Lützen, with 12,000 foot and 6,500 horse under his command, while the Austrian general had a force variously estimated from 12,000 to 50,000; it was probably superior to that of the Swedes. The night was spent in preparation for battle. The morning of the 16th broke foggy, and when the mists rose, about 10 o'clock, the Swedes were seen kneeling in their ranks. They sang Luther's hymn, *Eine feste Burg ist unser Gott*, "A tower of strength is our God," and a hymn composed by the king, and then charged upon the enemy, Gustavus leading the right wing and Bernhard of Weimar the left. The imperialists were driven from their strong intrenchments, but meanwhile Pappenheim arrived with a body of cavalry from Halle, and the Swedes were turned back in confusion. Gustavus threw



himself into their midst, rallied them, and with a small body of horse rode forward to support the infantry in a fresh attack; but approaching too near a squadron of imperial cuirassiers, he received a shot in the arm, and as he turned to be led away another in the back which caused him to fall from the saddle. His horse, which had been wounded in the neck, dragged him some distance by the stirrup, and galloping riderless back to the ranks roused the Swedes to fury. Led by Bernhard of Weimar, they rushed forward with an impetuosity which nothing could resist. Pappenheim fell mortally wounded, and Wallenstein at last ordered a retreat. The dead body of the king was found covered with wounds. After having been embalmed at Weissenfels, it was carried to Stockholm, and there interred in the church of Riddarholms. It was believed that the duke of Saxe-Lauenburg, the king's cousin, who was with him when he fell, and a few days afterward went over to the Austrians, inflicted the wound in the back of which Gustavus died, but most later historians discredit this story.—Gustavus inherited the commanding presence, eloquence, and accomplishments of his grandfather. Honor and glory were his passion. He aimed at great conquests, but the extent of his ambition can hardly be conjectured, for he died before his plans could be developed. The changes which he made in the systems of warfare have already been alluded to, but he owed his success in battle mainly to strict discipline and the ardor with which his personal character inspired his soldiers. His magnanimity, clemency to the vanquished, and respect for the religious opinions of others, challenged the esteem of his enemies. Though eminently a warlike king, he devoted much time to the internal affairs of Sweden; he organized the classes of nobility, encouraged commerce and manufactures, made excellent regulations for working the mines, abolished trial by single combat, endowed the university of Upsal, and founded the first Swedish gymnasium. Gustavus was married in 1620 to Maria Eleonor of Brandenburg, whose court he had visited in disguise for the purpose of choosing a wife. Their daughter Christina was his successor.

GUSTAVUS III., king of Sweden, eldest son and successor of King Adolphus Frederic and Ulrica Louisa, princess of Prussia, born in Stockholm, Jan. 24, 1746, died there, March 29, 1792. He was educated with much care under the successive superintendence of Counts Tessin and Scheffer. His ambitious tendencies early awakened the anxiety of these noblemen, who vainly attempted to restrain and correct a disposition which betokened ill to Sweden. Manly exercises, social pleasures, and pursuits of art and science, were his favorite occupations; and fond as he was of display, his indulgences were always characterized by external good taste. On his accession to the throne, Feb. 12, 1771, he found the condition of the country deplorable. The state was divided between

two great political factions, alike sordid and corrupt. They were the "Hats" and "Caps," or "France and Commerce," against "Agriculture and Russia." Under the weak Adolphus the Hats obtained the administration, and in secret meetings proposed to subvert the constitution by force, and to rescue the country from the domination of the nobles. Gustavus, who at the time of his father's death was travelling on the continent, procured from the French government a promise of arrears of subsidy, an annual payment of 1,500,000 livres, and of strong support against the aristocratic party. Hastening to Sweden, he practised much art to obtain popularity among the lower classes, and, while affecting an earnest desire to reconcile parties, secretly fomented the discord. His emissaries actively propagated disaffection to the diet. A revolt seemed imminent, and armed forces were spread over the country as if to overawe the enemies of the state. Having thus matured a deep-laid scheme, Gustavus confided the secret to a favorite officer, Hellichius, who proceeded to excite an open demonstration against the state at Christianstadt. He shut the city gates, and published a manifesto against the diet. The place was immediately invested by government troops, and a siege pretended, while Stockholm was declared under martial law. Meanwhile Gustavus, having secured the support of the troops, posted a guard over the assembled senators, harangued the people on the great square, entered the hall with a strong guard of adherents, displayed his eloquence to the confounded assembly, and produced a new constitution, which was immediately approved and confirmed by subscription and oath. The diet acquiesced with great unanimity; and thus, on Aug. 21, 1772, without the loss of a single life, a revolution was accomplished. The government he created was doubtless better than that of the oligarchy he had overthrown. The royal authority was enlarged, yet less at the expense of the representatives of the nation in the diet than of the council or senate. Gustavus now gave his attention to promoting the prosperity of his country. In 1788 he went abroad again, visited Italy for the sake of the baths of Pisa, and passed some time in Paris. During his absence a famine made great havoc among his subjects. The people were disturbed. The nobility rose against Gustavus's despotic power, and the diet forced him to make concessions of authority. The king, who in 1772 was the idol of the nation, had become in 1787 an object of detestation. War, which he had ever longed for, was now looked to as necessary to stimulate loyalty. It was most convenient to make it with Russia, whose northern frontier lay exposed, the troops being all engaged against the Turks, and preparing against the Poles. Gustavus secretly directed the commanding general in Finland to march upon St. Petersburg, and, having quelled a revolt in the army and an uprising of the nobles, caused by his unconstitutionally declaring war without legis-

lative sanction, secured extraordinary powers, and repulsed, at the head of a body of Dalecarlian peasants, the Danes who menaced Gothenburg, he began in person a vigorous campaign against Russia. The war continued with varying success during 8 years, and was terminated by a peace on terms honorable to Gustavus after the Swedish naval victory of Swenksand, July 9, 1790. Secretly dissatisfied, however, with the result of the war, he resolved to take part in restoring the power of Louis XVI., and aimed at heading a Swedish, Russian, Prussian, and Austrian coalition for the invasion of France. He went to Spa and Aix la Chapelle to concert measures, but before his plans were matured he was assassinated at a *bal masqué* in Stockholm by Anckarstroom, the instrument of a conspiracy of some of the disaffected nobles, and who had been already tried for treason as early as 1790. Gustavus lingered 18 days after receiving the fatal shot. He was a man of great ability, but capricious and insincere. While it suited him to court the French government, the ally of the United States, he made overtures to Dr. Franklin in Paris for a treaty recognizing American independence 6 months before the peace. He subsequently, in flattering terms, requested that it should not be forgotten by congress that he was the first European monarch to volunteer the recognition. This was in 1788. We find him next year writing to Counts Stedingk and Fersen, forbidding them to wear the badge of the Cincinnati which Washington had conferred upon them. "It is," he said, "a mark of successful revolt, whose cause and motives were unjust and unfounded. The success which legalizes an enterprise cannot justify it." His reign was distinguished by encouragement of letters, and a good internal economy. He corresponded with many distinguished savants, and was the author of dramatic works and lyric poems of considerable merit. His writings were published in Swedish in Stockholm in 1806-'12 in 6 vols., and also in French. On June 28, 1788, before his departure for the Finnish war, he deposited 2 boxes in the library of Upsal, requesting that they should only be opened 50 years after his death. They were opened March 29, 1842, and found to contain historical and literary essays and letters, which were published by Geijer (8 vols., Upsal, 1848-'6), and translated into German. He created the order of knighthood known as the "Vasa," and decorated men of science and letters no less than military officers. He built the fine opera house which was destined to be the scene of his assassination, and improved the capital with new embellishments. His queen was Sophia, a Danish princess.

GUSTAVUS IV. ADOLPHUS, king of Sweden, only son of Gustavus III., born Nov. 1, 1778, proclaimed king March 29, 1792, died Feb. 7, 1807. During his minority the kingdom was placed under the regency of his uncle, the duke of Sudermania, afterward Charles XIII. He was declared of age on completing his 18th year, Nov.

1, 1796. During the regency, the Swedish policy was diametrically opposite to that pursued by Gustavus III. The regent in fact was the first prince in Europe to recognize the French republic. Gustavus had been betrothed at an early age to a princess of Mecklenburg, but the empress Catharine II. of Russia, one of whose favorite designs was to obtain the direction of Swedish affairs, planned a marriage for him with her granddaughter Alexandra. Gustavus accepted an invitation to visit the imperial court, and was received with splendid hospitality. The princess possessed great beauty and a charming wit, and he fell in love with her. The marriage was about to be solemnized. The empress upon her throne, the court collected in state, and the young bride wondering at the delay, all awaited the appearance of the groom. At the latest hour he had been permitted to examine the marriage contract; in it he discovered treachery; he was to declare war with France, and permit his queen to remain in the Greek church. Enraged at a stratagem of which he was about to be the dupe, he forthwith rejected the alliance, returned immediately to Stockholm, and became next year the husband of the princess Frederica of Baden (from whom he was divorced in 1812). With the czar Paul, who had succeeded Catharine, he negotiated the renewal of the armed neutrality, repairing in person to St. Petersburg for the purpose. After the murder of Paul, his successor Alexander lost no time in making peace with England. Nelson had forced Denmark to withdraw from the northern league, and Prussia and Sweden could not alone sustain it. The peace of Amiens followed, and Gustavus endeavored to engage Alexander in resisting the career of Napoleon. They alone among the sovereigns of Europe protested against the execution of the duke d'Enghien; and in the Germanic diet, in which Gustavus as duke of Pomerania had a voice, he inveighed boldly against the French emperor. Napoleon replied in the *Moniteur*, reproaching Gustavus with having deserted the Danes, and satirizing the young king as the heir of Charles XII. only in "jack boots and audacity of tongue." Gustavus had early assumed the dress and professed to imitate the spirit of his predecessor. The French minister was peremptorily dismissed from Stockholm, and French newspapers forbidden the kingdom. The king soon after took the field in person against Bernadotte, who occupied Hanover with 80,000 troops. Austerlitz and the peace of Presburg obliged him to retreat, and the campaign was confined to unimportant skirmishes in Prussia. The peace of Tilsit was forced upon Russia and Prussia; and Gustavus alone upon the continent of Europe held out against the French empire. Napoleon attempted to dazzle the young king with visions of Norway; but his overtures were rejected with indignation, and Gustavus was driven, fighting to the last and unsubdued, across the Baltic. The last trace of the continental grandeur of Gustavus.

Adolphus was torn from his luckless descendant, who now, shut up in his northern peninsula, stood alone with England against Europe. Robbed of Pomerania, he was now to be despoiled of Finland. Some time before this he had irritated the emperor Alexander by childish conduct, which seemed to indicate the mental derangement afterward attributed to him. At length, Napoleon and Alexander having come to an understanding at Erfurt for the partition of Sweden, Caulaincourt announced to his diplomatic colleagues at St. Petersburg that "Gustavus IV. had ceased to reign." Supported by England with a subsidy for one year of £1,200,000, and the assurance of auxiliary troops, Sweden presented everywhere a bold front. A Russian army overran Finland, and at this period the unfortunate Gustavus had the unparalleled folly to quarrel with Sir John Moore, who had come to his assistance with 10,000 English troops. For some time he forbade their landing, and the English general returned home in disgust. With more than 100,000 Swedes under arms, Gustavus managed never to have 10,000 together; and these he exhausted in continued forced marches, now threatening a descent upon Denmark, now upon Norway, and again hurrying across the whole breadth of Sweden to renew the war in Finland. English subsidies and Swedish supplies he squandered senselessly; and we read that in the midst of his distresses he sold arms and ammunition to the enemy in Finland, being engrossed for the moment in devising a new shako for his guard. The English minister was instructed to release Sweden from her English obligations, if she should find her necessities such as to render concessions inevitable. Taking the proposal as an insult, Gustavus, without consulting his cabinet, sent a despatch to Gothenburg subjecting the British shipping in that harbor to an embargo. Next morning he recalled the rash order, and offered a renewal of alliance with England on the same subsidiary basis. His mismanagement was long attributed by the people to the incapacity of his council; but the truth could not be always concealed. His deposition came to be considered the only means of salvation. A plot soon took form and order, and it was resolved by a band of resolute nobles to offer the crown to the English duke of Gloucester. The offer was made, but was not considered available. Notwithstanding the secrecy natural to such a plot, it was soon rumored that Gustavus was about to be deposed, and the prospect appeared to elate the population. A body of troops quartered along the Norwegian frontier marched upon Stockholm, and Baron Adlercreutz, having accepted the charge of arresting the king, disposed his associates about the palace, occupied the antechamber with a few picked men, and entering the royal cabinet said, without preface: "Sire, I have come in the name of the nation to demand your sword." Gustavus drew it from the scabbard, and was about to plunge it into the speaker's breast.

Servants and sentinels sprung to his side; and Adlercreutz, parrying the king's thrust, gave the signal. Gustavus, struggling like a madman, was disarmed; but breaking loose, escaped from the room. He was overtaken, committed to the castle of Gripsholm across the lake, and was there honorably provided for. The people of Stockholm learned the news with universal satisfaction. In Dalecarlia a sentiment of loyalty to the descendant of Gustavus Vasa rose to the surface, but soon evaporated. The late regent, the uncle of the imprisoned king, accepted the direction of affairs at the hands of Adlercreutz. He was made protector, and presently elected king as Charles XIII. Meanwhile Gustavus at Gripsholm resolved to anticipate, by abdication, the final and official verdict from the diet of dethronement. In a document, dated March 29, 1809, he declared his purpose, expressing his previous good intentions, and his desire now to resign his crown and dedicate his days thenceforth to God. The diet assembled, solemnly renounced allegiance, and declared the heirs of his body for ever excluded from the throne. The exiled family proceeded about 8 months after the king's arrest in a Swedish frigate to Germany, Gustavus having assumed the title of count of Gotthorp. The Swedish government settled upon him a pension equivalent to \$26,000. Charles XIV. (Bernadotte) subsequently condemned the sequestration of the property of the deposed prince, and demanded from the diet authority to adjust equitably all money affairs between Sweden and the exiled Vasa family. The authority was granted, and the king paid over to the Russian emperor, the brother-in-law of Gustavus, and the guardian of his children (their unhappy father having separated himself from his excellent wife and family), the capitalized value of his private estates, about \$600,000. This was duly transmitted as a private fortune; and the pension consequently ceased thereafter to appear in the Swedish budget. The exiled king was offered one third of the pension meanwhile; the remaining two thirds were for the queen and her children. Gustavus had been a tyrannical husband. Almost his first act after reaching the continent was to procure a divorce, and his queen was happy to be allowed to educate her children. An only son, the present prince of Vasa, bearing the title of royal highness, is an officer of the Austrian army. The eldest of her 3 daughters became afterward by marriage grand duchess of Baden. In 1810 Gustavus visited England, where he was somewhat unwelcome. He lived nevertheless at Hampton Court, and found companionship among the royal exiles of France. In 1812 he went to Denmark, where he assumed for a time the title of duke of Holstein, but gave it up by request of the Danish government. He soon after proposed to join a Moravian brotherhood in Saxony, who managed to waive the project. He subsequently wandered about Europe, often in great need, for he proudly refused the Swedish contribution. His repudiated wife

and their children appear to have watched over him, and often devised means of placing in his way adroitly what appeared to be necessary for his support. Sir Sidney Smith presented his protest to the congress of Vienna, while he was living, without even a servant, at a poor inn at Trieste. He subsequently assumed the name of Col. Gustafson, and planned a journey to Jerusalem in company with a number of knights of St. John, whose mystical religious badge he now habitually wore. This project was abandoned in consequence, it is said, of the sultan refusing passports. During the later years of his life he was an object of compassion. His conduct became more subdued. He appeared in threadbare garments, proud to be beholden as he believed to no one, and seeming to glory in privations and poverty. He became a resident of the canton of Basel, and died at length in a humble abode at St. Gall. In 1828 his son ineffectually memorialized the courts of Europe in support of his claim to the title of prince of Sweden, and, upon the death of his father, to the style and dignity of majesty. The claim was resented by the Swedish government, and encountered a skilful refutation from the Swedish envoy in London, Count Björnstiern. The claim was again publicly renewed in 1859, on the death of King Oscar. The decree of Dec. 10, 1812, forbidding all intercourse with the family of Gustavus IV., was abrogated by the late King Oscar in May, 1844. The remains of Gustavus, deposited March 29, 1845, in the funeral chapel of Eichhorn, in Austria, have since been removed to Oldenburg. French, Danish, and German editions of many of his writings have been published.

GUTENBERG, JOHANNES, or HENNE, the reputed inventor of printing, born in Mentz, Germany, about 1400, died there, Feb. 24, 1468. His father's name was Gensfleisch or Gansfleisch, but he is commonly known by that of his mother, or of the estate of Gutenberg, which belonged to the family. He was of noble descent, and occupied a respectable position in his native city, from which, however, civic dissensions caused him, with many others, to migrate in 1420. In 1424 he was residing in Strasbourg, of which city he became a citizen, and where he appears to have devoted many years to mechanical experiments of various kinds. In 1436 he entered into a contract with Andrew Dritzehn and others, citizens of Strasbourg, for the purpose of practising in partnership, and for the common benefit, all his secret and wonderful arts. Three years later he was sued by the brother of Dritzehn, who had died in the interval, for money due the latter by the terms of his contract; and in the course of the trial it was shown that among the wonderful arts which Gutenberg was to reveal to his associates was printing, and that as early as 1438 he was in possession of a press, movable types, forms, and other appliances of the art. As he never affixed his name to the title pages of his books, it is not certain that he produced any printed works at Strasbourg. Be-

tween 1439 and 1444 he appears to have resided in Strasbourg; but from that time until the latter part of 1448, when he was in Mentz, all trace of him is lost, nor is it known whether during this period he was perfecting his invention or experimenting in other fields of science. In Aug. 1450, he entered into a partnership with Johann Faust of Mentz for the purpose of carrying on the business of printing, the latter, a man of considerable means, undertaking to furnish the funds. (See FAUST, JOHANN.) The partnership terminated at the end of 5 years in a suit brought by Faust against Gutenberg for moneys advanced, and the latter was obliged to surrender the greater part of his printing materials to Faust, who continued the business in partnership with his son-in-law, Schöffer. With such materials as remained to him, after the claims of Faust had been satisfied, Gutenberg established himself in the house *Zum Gutenberg*, belonging to his mother, where he appears to have carried on printing with considerable activity, and to have associated himself with a Doctor Conrad Homery, who, after the death of Gutenberg, took possession of the stock. In 1455 Gutenberg abandoned printing, and entered into the service of the elector Adolphus of Nassau, as a gentleman of the court, with a suitable compensation. The number and character of the works printed by him, or with his coöperation, have afforded a fruitful subject of controversy, and by many it has been maintained that his merit was altogether that of an experimenter. In his own, and in modern times, he has to a certain extent been obliged to share with Faust and Peter Schöffer the credit of his invention; and so obscure are many passages of his history that his name has almost been considered a myth. Schöffer in several instances publicly claimed the invention for himself, and also for his father-in-law, Faust; but in the preface to a German translation of Livy, published in Mentz in 1505, it is distinctly stated by his son Johann Schöffer that the "admirable art of printing was invented in Mentz in 1450 by the ingenious Johann Gutenberg, and was subsequently improved and handed down to posterity by the capital and labor of Johann Faust and Peter Schöffer." The testimony of his contemporaries, and the opinion of most modern writers, seem to agree, however, that Gutenberg not merely invented the art, but practised it for many years previous to his death, and long before he became associated with Faust. Zell, a contemporary writer, mentions a *Catholicon*, and one or more editions of the *Donatus*, possibly printed at Strasbourg, and of the former of which no copy remains. Another *Catholicon*, called the *Catholicon Joannis Januensis*, was published by Gutenberg in Mentz in 1460. During the partnership with Faust appeared the "Letters of Indulgence," the "Appeal against the Turks," and the well known Mazarin Bible, their joint production; and of the celebrated Psalter, published by Faust and Schöffer in Aug. 1457, within 18 months

after the separation from Gutenberg, and containing their imprint, much of the work was undoubtedly done by the latter. In addition to these, the "Calendar for 1457," the *Hermannus de Saldia Speculum Sacerdotis*, published about 1457, and the *Celebratio Missarum*, have been ascribed to him, although Dr. Dibdin thinks very doubtfully of the two latter, as well as of the Donatuses, and is inclined to consider the *Catholicon* of 1460 and the "Vocabularies" of 1487-'9 more genuine specimens of his press or of the types used by him. The other works sometimes ascribed to Gutenberg, such as the two papal bulls in favor of Bishop Adolphus of Nassau against Dietrich, the *De Oratore* of Cicero, the *Valerius Maximus*, &c., are of very doubtful authenticity. Posterity has endeavored to repair the neglect which Gutenberg experienced during his life by paying periodical honors to his memory. In 1540, a century after the invention of printing, the city of Wittenberg first publicly celebrated the event. The example was followed in the succeeding century by Strasbourg, Breslau, and Jena, and many cities of Germany have since held centennial jubilees in honor of Gutenberg and his invention. In 1837 a statue of him in bronze by Thorwaldsen was erected in his native place, and in 1840 Strasbourg, the birthplace of the art, inaugurated with great pomp one by David d'Angers.—The chief authorities on the life of Gutenberg are: *Essai d'annales de la vie de Gutenberg*, by J. G. Oberlin (Strasbourg, 1801); *Essai sur les monuments typographiques de Gutenberg* (Mentz, 1803), and other works, by M. G. Fischer; *Éloge historique de Jean Gutenberg*, by Née de la Rochelle (Paris, 1811); *De l'origine et des débuts de l'imprimerie en Europe*, by Auguste Bernard (2 vols., Paris, 1853); *Essai historique de Gutenberg*, by J. P. Gama (Paris, 1857); and Lamartine's memoir entitled *Gutenberg l'inventeur de l'imprimerie* (Paris, 12mo., 1858), which is an eloquent eulogium on the art of printing and its inventor. See also an article giving a summary of the facts and the arguments which the life and works of Gutenberg have evolved, by Ambroise Firmin-Didot in the *Nouvelle biographie générale*.

GUTHRIE, JAMES, an American statesman, born in Nelson co., Ky., in 1793. His father, Gen. Adam Guthrie, was a Virginian, and one of the early settlers of Kentucky. He was a renowned Indian fighter, and was engaged under Gen. Hardin in the battle of the Saline, near Shawneetown, Ill., where the Indians were decisively defeated. He represented his county in the Kentucky legislature for 8 or 10 years. His son received an academical education at Bardstown, and after completing his studies engaged in the Mississippi trade, as it was called, and made several voyages to New Orleans with flat boats loaded with country produce, returning home sometimes on horseback, sometimes on foot. After a year or two spent in this way he applied himself to the study of law, was admitted to the bar, and in

1820 established himself in Louisville, where he soon attained an extensive practice and became distinguished in his profession. He was frequently chosen to represent the city of Louisville in the lower branch of the state legislature, and the county of Jefferson in the senate; and being a democrat in a strongly whig district, he was almost always elected when his party was in a minority. He was a member of the convention which framed the Kentucky constitution of 1850, and was elected president of that body. On March 7, 1853, he was appointed by President Pierce secretary of the treasury of the United States, which office he held till March 4, 1857.

GUTHRIE, THOMAS, D.D., a Scottish clergyman, born in Brechin, Forfarshire, in 1800. He was educated for the ministry in the university of Edinburgh, and was subsequently licensed to preach by the presbytery of his native place. Before commencing his pastoral duties, however, he studied medicine in Paris with a view of assisting the poor medically. In 1830 he was ordained over the parish of Arbroath, Forfarshire, whence in a few years he was called to Edinburgh, where he was successively minister of the collegiate church of Old Grayfriars and of St. John's. In both parishes he enjoyed a great reputation for philanthropy and pulpit eloquence. He was a prominent mover in what was called the "non-intrusion controversy," the object of which was to allow parishes the privilege of electing their ministers, and coöperated with Drs. Chalmers, Cunningham, and Candlish in establishing in 1843 the Free church of Scotland, of which he has since continued a prominent member. During the famine of 1847 he rendered great assistance to his destitute countrymen, and was instrumental in instituting in Edinburgh industrial schools for the benefit of destitute and homeless children.

GUTHRIE, WILLIAM, a Scottish miscellaneous author, born in Brechin, Forfarshire, in 1708, died in London in 1770. He studied at the university of Aberdeen, and for some time was a schoolmaster. Of the numerous works which bear his name the most important are a "General History of England" (8 vols. fol., London, 1744-'50); a "General History of Scotland" (10 vols. 8vo., 1767-'8); a "General History of the World," in connection with John Gray (12 vols. 8vo., 1764-'7), translated into German; and a "Geographical, Historical, and Commercial Grammar," of which numerous editions in all sizes appeared, the 1st in 1770, the 24th in 1827, &c., and in 18mo., abridged, 1842.

GUTIERRES, GARCIA, a Spanish dramatist, born in 1815. His first piece, *El Trovatore*, which served afterward as the text for Verdi's opera, was favorably received, and was followed by *El page*, *El rey moro*, *Magdalena*, and other plays.

GUTHS-MUTHS, JOHANN CHRISTOPH FRIEDRICH, founder of the German system of gymnastics.

tics (*Turnvoesen*), born in Quedlinburg, Aug. 9, 1759, died May 21, 1839. He studied at the gymnasium of his native place, and at the same time was employed as tutor in the family of the physician Ritter. In 1779 he entered the university of Halle, where he passed 3 years in the study of theology. He then resumed his engagement with Dr. Ritter, as tutor of his children. In 1786, having conducted one of his pupils, the afterward celebrated geographer, to the Schnepfenthal institute, he made the acquaintance of Salzmann, the founder of that school, and was employed by him to superintend the gymnastic exercises of the scholars, which, as Guts-Muths thought, ought to enter largely into every plan of education. He did much to spread his system in Germany, and published several works on the subject, among which were his *Gymnastik für die Jugend* (Schnepfenthal, 1798); *Spiele zur Uebung und Erhaltung des Körpers und Geistes für die Jugend* (1796); *Kleines Lehrbuch der Schwimmkunst* (Weimar, 1798); *Turnbuch für die Söhne des Vaterlands* (Frankfort, 1817). He had, however, no sympathy with the liberal ideas which were afterward associated with gymnastic exercises. His course of physical training was introduced into many establishments abroad, and into the Prussian army. In 1797 he retired to an estate near Schnepfenthal, where he continued to devote a certain portion of his time to teaching gymnastics, technology, and geography. He left several works on the last science, which are much esteemed; among them are his *Handbuch der Geographie für Lehrer* (Leipzig, 1810), and *Methodik der Geographie* (1835). His centennial anniversary was celebrated with great pomp at Schnepfenthal, Aug. 9, 1859.

GUTTA PERCHA (Malay, *gutta*, gum, and *percha*, the name of a tree), the inspissated juice, called *gutta taban* by the Malays, the name being misapplied by the English. The tree which produces the gum was referred by Sir W. J. Hooker in 1847 to the natural order *sapotacea* and Dr. Wight's new genus *isonandra*, and named the *isonandra gutta*. It abounds in the forests along the foot of the hills in the Malayan peninsula, and forms the principal portion of the jungle in the bottoms. It is also met with in Borneo and other islands of the Indian archipelago. It is a large tree, commonly 8 to 4, but sometimes 6 feet in diameter, with a straight trunk, and reaching the height of 60 or 70 feet. The branches are numerous and ascending, and crowded with leaves at their extremities; these are petiolate, oblong, 4 or 5 inches long and 2 wide, of bright green above and brownish beneath. The flowers are small and white. The wood is peculiarly soft, fibrous, and spongy, pale colored, and traversed by longitudinal receptacles filled with the gum, forming ebony-black lines. To the Malaysans the valuable properties of the juice of the tree were known long before the Europeans became acquainted with the article. The natives found that the gum would

become soft and plastic in hot water, and, being then moulded into any form, would retain this when cold. They made it into basins, vases, shoes, elastic sticks, whips, handles for *parangs*, or axes, &c. The attention of Europeans was first called to it in 1842 by Dr. William Montgomerie, assistant surgeon to the residency at Singapore; and in 1843 Dr. D'Almeida of the same place brought specimens of the gum to England and laid them before the royal Asiatic society. They attracted little attention, however, till further communications from Dr. Montgomerie established the importance of the article by showing its applicability to the same uses as caoutchouc, and to others beside, and also the low cost at which the material could be procured in the greatest abundance. In 1844 a shipment of 2 cwt. was made from Singapore as an experiment, and soon after the product, as was the case with guano two years previously, suddenly became a commercial article of importance. In the first 4½ years of the trade there were shipped from Singapore 21,598 piculs (of 133.8 lbs. each), valued at \$274,190; of which 922 piculs were sent to the United States. In 1847 Dr. Oxley of Singapore published an interesting account of the tree and its product in a Singapore journal, describing the uses to which he had applied the gum for surgical instruments. He stated that the large trees which were formerly very abundant on the island of Singapore had been nearly all cut down by the natives, who adopted this destructive method of obtaining the juice, and who had sacrificed by his estimation 69,180 trees to procure  $\frac{1}{10}$  this number of piculs, which was the exportation from Jan. 1, 1845, to July, 1847. The custom of tapping has since been introduced. The sap soon coagulates after it is collected, or it is made to do so by boiling, and is then kneaded by hand into oblong masses, 7 to 12 inches long and 4 or 5 broad. Its dark reddish brown color is derived from the impurities, as bits of the bark, that have accidentally fallen into the juice, or from sawdust and other substances introduced as adulterants. The gum may be obtained pure by dissolving the crude article in sulphuret of carbon or oil of turpentine, straining and evaporating. It is then of a grayish white color, with slight odor and no taste, hard and tenacious, and with an unctuous feel. In thin leaves it is semi-translucent. Owing to its porous structure containing bubbles of air, it is of a little less density than water, the commercial article having an average specific gravity of 0.975. Under some conditions it may be made more dense than water. It burns with a bright flame, emitting sparks, and dropping a black residuum. At a moderate temperature it is tough and inelastic, is cut with a knife with difficulty, but becomes soft and flexible by accession of heat, without, however, ever acquiring the peculiar elasticity of caoutchouc. Above 150° F. the substance is sufficiently plastic to be moulded into any form, or drawn out into threads or tubes, or rolled

into thin sheets, which when cold retain these shapes with the original toughness and inelasticity of the substance. Being unaffected by damp, it is an excellent material for waterproof articles and utensils that are required to withstand the action of moisture and of various chemical reagents, as alcohol, hydrochloric acid, alkaline solutions, the fatty oils, fermented liquors, &c., which have no effect upon it. In water it is insoluble at all temperatures. Its best solvents when cold are bi-sulphuret of carbon and chloroform. Benzole and oil of turpentine dissolve it but partially when cold. Ether is capable of dissolving it if free from alcohol, and if the gum has not been previously treated with alcohol. Gutta percha, when dry, is as bad a conductor of electricity as shell lac or any other known substance, and hence, in connection with its other properties, its suitability for covering submarine telegraph wires. It possesses in the form of pipes peculiar acoustic properties, which render it a valuable material for speaking tubes in public houses and large establishments. It consists of carbon 86.86, hydrogen 12.15, and oxygen 1.49 per cent.—a composition identical with that of caoutchouc, except in the presence of oxygen, which is wanting in the latter. In the gutta percha this element is probably to be referred to the air contained in the pores. When distilled it affords of volatile matter  $57\frac{1}{2}$  per cent.; caoutchouc yields  $85\frac{1}{2}$  per cent. The former gum, moreover, not being affected by oils, can be advantageously used in contact with leather; while the latter, in the same relation, is decomposed by the action of the oils in the leather.—The treatment of gutta percha is similar to that already described under *CAOUTCHOUC*. The first process is to purify it of the foreign substances, as earth, stones, and sticks, with which it is contaminated. For this purpose the blocks are sliced, by knives attached to powerful wheels, into shavings. These are introduced into a large tank of water, heated by escape steam to boiling. The gum softens and runs together, and by the boiling most of the impurities separate and subside. The mass is then removed to a machine called a teaser, which is a large box containing a drum armed with rows of crooked teeth. This revolving rapidly tears the gum into shreds, which fall into a vessel of water, in which it floats, and the remaining impurities subside. The purified fragments are again boiled; they again run into a soft mass, and this is taken into the kneading or masticating machine, which is a strong cast iron box containing a revolving cast iron drum armed with strong iron teeth; or instead of the drum, 2 parallel rollers with screws on their surface are employed. Steam is let into the machine, and the gutta percha, kept soft by its heat, is thoroughly kneaded and brought to uniform consistency without air or water in the mass. It is then ready to be rolled into sheets or pressed into tubes; the former in their various sizes and thicknesses furnish the article in shapes convenient of appli-

cation to most of the uses for which it is adapted. The rollers are steel cylinders adjusted at pleasure to turn out the thinnest tissue or the thick belts used for machinery. As the strips pass out from between them, they are rolled up by a cylinder placed so far off that the material may become cool in reaching it, or the cooling is hastened for the thick bands by fans arranged to blow air over their surface as they pass along. To form narrow strips and cords, the bands before leaving the rolling machine are sometimes slit by knives set in a frame. A pair of rollers with transverse semicircular grooves upon the face of each, adapted to make a round opening, are also used for the same purpose, the sheet of the thickness of the diameter of the opening being passed between them, as it issues from a steam chamber heated to  $200^{\circ}$ . The grooves may be shaped to give different forms of cord. The gum in a plastic state is sometimes drawn through a gauge as in the manufacture of caoutchouc cords. The sheets are also cut by stamps in various shapes, as soles for shoes; and they are applied upon cores and moulded into hollow articles, as buckets, bowls, bottles, water-proof hats, &c., and of the cords are made rings, whips, &c. Many of the articles are impressed while warm by dies in ornamental figures. Tubes are produced by forcing the kneaded mass through a steel cylinder which terminates in a mould with a circular metallic core. Passing through this, the soft substance is prevented from collapsing by being drawn through a long channel of water by the revolution of a drum at the other extremity of the canal. By continually supplying the material the tubes are made without interruption; and in this way a single length has been produced of 1,000 feet. These tubes by their remarkable strength are well adapted for resisting great pressures; they are used for aqueducts, for feed pipes of steam engines, for hose, pump barrels, and various other purposes connected with the conveyance of water, gases, and vapors. An experiment was made some time since at the Birmingham water works, England, with a  $\frac{1}{2}$  inch pipe of  $\frac{1}{4}$  inch thickness. For 2 months it withstood without injury the pressure of 200 feet head of water, and was afterward unaffected when exposed to the pressure of 337 lbs. on the square inch. In Boston a pipe of  $\frac{1}{2}$  inch bore burst under a pressure of 390 lbs.; a  $\frac{3}{4}$  inch pipe used for service pipe for the Cochituate aqueduct bore a pressure of 580 lbs.; and a  $\frac{1}{2}$  inch pipe, made for soda fountains, bore the pressure of 1,000 lbs. to the square inch.—In the summer of 1843 Mr. Samuel T. Armstrong of Brooklyn, N. Y., devised a modification of the machinery for making gutta percha tubing for the purpose of coating telegraph wires, an application of the material which he claims as original with him. It is also claimed for Dr. J. J. Craven of Newark, N. J., who in the spring of the same year prepared such a wire, which was afterward laid across the Passaic and Hudson rivers on the line be-

tween Philadelphia and New York. The first machinery built for this purpose was put up in the autumn of 1843 at the works of the American gutta percha company at Brooklyn, of which Mr. Armstrong was president. The first order for the prepared wire was for the Morse telegraph company, and the wire was laid across the Hudson at Fort Lee in Aug. 1849. The plan of the machinery was suggested by that put up at the same time for making the gutta percha pipes, and when successfully proved at Brooklyn, it is said to have been furatively carried to England, and there put in operation one year after the cables were in use in the United States. By this the submarine cable was made for the Atlantic telegraph. The gutta percha employed was prepared with the greatest care to insure its purity. The raspings, rolled and then macerated in hot water, were washed in cold water, and then, being softened by boiling water, were driven by hydraulic apparatus through cylinders, in the end of which were wire gauze sieves. After this the substance was thoroughly masticated and kneaded, by which it was entirely deprived of moisture and rendered homogeneous and compact; and it was then introduced into the long horizontal cylinders kept hot by steam, and powerfully compressed by screw pistons worked by machinery. As it was forced out at the extremity the gutta percha was made to pass through a die, in which the strand of copper wires was introduced, and the whole was drawn along by a revolving drum upon which it was wound. A second and third layer of gutta percha were added to the core by repetitions of the process. Mr. Charles Goodyear applied the same process to moulding various articles in gutta percha, attaching the moulds, which were of metal in several pieces securely bolted together, to the end of the cylinder, through which the plastic gum was forced. Holes were left for the escape of the air in the moulds, and the appearance of the gutta percha at these indicated the completion of the filling.—Gutta percha is often used in combination with caoutchouc, the latter serving to soften and render the material more pliable and elastic, and less liable to be affected by changes of temperature. Both are alike affected by the treatment called vulcanizing, which is thoroughly mixing the gum with sulphur or some of its compounds, and then subjecting the mixture to an elevated temperature in close vessels. (See CAOUTCHOUC, and GOODYEAR, CHARLES.) The methods and materials employed for vulcanizing gutta percha are numerous, and the object desired is not always the same. A hard horny material is produced under the patent of Mr. Stephen Moulton, by mixing the gum with hyposulphite of lead and adding more or less calcined magnesia, and then subjecting the compound to a temperature of 250° to 300° for some hours. Mr. Hancock in his patent of 1847 employed a mixture of 48 parts of gutta percha with 6 parts of sulphuret of antimony, sulphuret of calcium, or some

other similar sulphuret, and one part of sulphur. Mr. Emory Rider of London in 1856 patented an improvement which consisted in the addition of one part of litharge to 66 parts of gutta percha, together with one part of sulphur, or its equivalent in some of its compounds. These substances are mixed and well incorporated into the plastic gum by the action of heated rollers, which, revolving at different speeds, powerfully wear and grind the material; after which, in a close metallic vessel one third filled, it is subjected to the vulcanizing temperature for a few hours. The patents for mixing gutta percha with other substances are too numerous to be particularly noticed; even these substances are almost innumerable. Other gums of similar character are employed, a variety of metallic sulphurets, ivory or bone dust, animal charcoal, ground whalebone, comminuted cocconut shells, raspings of horns and hoofs, calcined shells, asphaltum, crushed earthenware and porcelain and various stones, compounds of phosphorus, boron, silicium, and arsenic, chlorides of tin, zinc, and antimony, oxides of zinc, copper, &c. Arsenic has been used to prevent the decay of the vegetable compounds, and carbonate of soda to neutralize the acids generated by the substances introduced, whenever the acids might injure the materials to which the preparation is applied; and various perfumes have been added, as orris root, gum benzoin, musk, essential oils, Tonquin beans, &c., to give an agreeable scent in place of the peculiar odor of the gutta percha and the other gums of the same nature. The odor is also removed from fabrics prepared with gutta percha by subjecting them to the action of steam under very moderate pressure. The object of these various mixtures is evidently to produce materials of different qualities of hardness and of different capacities of resistance to changes of temperature and other causes of change, but which may still be moulded into and retain the forms of useful articles. Coloring matters also are employed before the vulcanization of the gutta percha, being ground into the plastic mass, and imparting to it their peculiar hues. The varnish used for coating textile fabrics is also sometimes prepared with coloring matters incorporated with its other materials. This preparation may be made with gutta percha and caoutchouc or other similar gum, mixed in any proportion, to which is added the quantity of sulphur or sulphuret employed in vulcanizing, together with 8 or 10 parts of animal or vegetable wax or fatty matter, the whole dissolved in rectified spirits of turpentine and evaporated. By an improved process the solvent and gum are distilled together; and by filtration through animal charcoal the solution is purified and decolorized. A certain quantity of the sulphuret of carbon solution being poured into a glass vessel, as a cylinder or a globe, the volatile solvent soon evaporates as this is made to flow around the sides. A continuous film of the gum covers the inside of the vessel; and if care is taken not



to warm the outside by touching it with the hand, this will not adhere, but may be removed through the aperture by which the liquid was introduced. Hollow semi-transparent cylinders and balloons may be thus produced; and the bottoms or closed ends of the former being cut off, sheets are made by splitting them lengthwise after the manner of making sheet glass. If the gutta percha does not readily separate from the glass, it may be made to collapse by introducing a closely fitting tube into the aperture and exhausting the air.—The articles made of gutta percha alone, or mixed with other substances, are of great variety, including numerous household utensils, pieces of architectural ornaments, decorations of furniture, chemical apparatus, surgical instruments, parts of machinery, &c. Some of the most common of these articles have already been named. There are beside bags of many kinds, portmanteaus, knapsacks, and cases for maps; boots, caps, sailors' hats, and many articles of water-proof clothing; playing dolls, combs, buttons, inkstands, clock cases, watch stands, picture frames, flower pots, mouldings, panels, leaves, friezes, insulating handles, lining for cisterns, funnels, siphons, &c., the last replacing the more fragile apparatus of glass or porcelain. The photographer finds it the best material also for the baths employed in his operations; the chemical manufacturer uses it for carboys, troughs, measures, dye vats, buckets, &c. In electrotyping it has been applied in a warm state to receive the impression of the types, and when cold and hard, being dusted over with graphite, has faithfully transferred to the copper deposited upon it the forms of the types. It has been found that the material may take the delicate lines of a wood engraving, and, being dusted over with graphite, can transfer these to a second cake, which may be used in printing. Life boats have been made of it; and its extraordinary strength and indestructibility render it admirably adapted for this use. A boat of this material upon a wooden frame was furnished to one of the arctic expeditions by Lady Franklin; and though it was exposed to the roughest work of the voyage, it was returned to England in very good condition. In New York one was exhibited in 1858, 16 feet long, of which the ribs and keel were all one piece with the rest of the boat. In surgery its use has been various and highly beneficial. Catheters and other tubes, splints, stethoscopes, &c., are made of it; but that for which it is peculiarly useful is encasing fractured, misshapen, and diseased limbs. It is applied in bands 2 or 3 inches broad and about a line thick; these are softened in hot water, and, being placed upon the limb, become firm without losing their pliability. Like collodion its solution makes a close adhesive film by evaporation of the solvent, binding together parts separated by incisions, or forming an artificial outicle when this is removed by cutaneous disease or other cause. The saturated solution in chloroform is particularly recommended for the dry, scaly, and tuber-

cular diseases of the skin, especially psoriasis. In dentistry, it is introduced into badly decayed teeth, as a temporary filling where gold could not be used, and its plasticity and durability render it a useful material for moulding into and retaining the form of the artificial gums for holding mineral teeth. (See DENTISTRY.) Thus is this recently discovered substance found to possess such a wonderful adaptation to produce more perfectly than any other material a multitude of articles essential to the wants of man, that it has rapidly grown to be an important article of commerce, and in some form is everywhere seen about our houses and persons. For covering submarine telegraph wires no material is known that could be substituted for it, possessing the several qualities of a perfect insulator, capacity of being moulded and then of hardening into the form given it, retaining at the same time great pliability and extraordinary toughness and strength. But for its introduction the telegraph might still be limited to districts not separated by large bodies of water. As a cement, gutta percha has been applied to numerous uses, as for securing joints in wood and stone work, and is also recommended for calking ships and boats, the oakum to be saturated with it instead of with tar, and pressed hot into the seams. It is also used as a coating upon the soles of shoes, either applied in solution and thus made to intimately mix with the fibre, or cemented to it in a sheet by pressure with a hot iron. This might be one of its most important uses were it not for its liability to be injured by over heat, to which shoes are exposed in cold weather.

GUTTA SERENA. See AMAUROSI.

GUTTÆ (Lat., drops), in architecture, small ornaments usually shaped like the frustum of a cone, used in Doric entablatures and made to hang from the soffits of the mutules and regula under the bands of the architrave. They are occasionally cylindrical in form, and sometimes bear the names of *lacryma* (tears) and of *campana* or *campanula* (bells).

GUTZKOW, KARL FREDERICK, a German author, born in Berlin, March 17, 1811. He studied there philosophy and theology, and afterward attended lectures on jurisprudence and political science in Heidelberg and Munich. He is the principal representative of the young German school of authors and politicians who take Heine and Börne as their models, of the latter of whom he is the biographer. In early life he wrote for Wolfgang Menzel's *Literaturblatt*. His relation with this eminent critic was broken off in 1835, when he joined Eduard Duller, who edited the *Phönia* in Frankfort-on-the-Main; and he has since successively resided in that city, in Hamburg, and more recently in Dresden. Many of his writings, especially his novel *Wally, die Zweiflerin* (Mannheim, 1835; new ed., Frankfort, 1852, under the title *Vergangene Tage*), by its alleged attacks upon Christianity, became obnoxious to several German governments, and he was detained in prison for 8 months, during which time he manifested his

opposition to the Hegelian view of history in his *Zur Philosophie der Geschichte* (Hamburg, 1836). His works comprise *Beiträge zur Geschichte der neuesten Literatur* (new ed. 1839), many critical and satirical compositions (one of the best of the latter being *Die rothe Mütze und die Kapuze*), and a long series of novels and plays. Many of the former are so called *Tendenznovellen*, or novels animadverting on the political and social order of things. The more celebrated are *Die Ritter vom Geiste* (9 vols., 3d ed. 1854), and the most recent, *Die Diakonissin* (1855), and *Der Zauberer von Rom*, the 1st vol. of which appeared in 1858. Among his dramatic works are *Richard Savage*; *Werner*; *Pugatsch*; *Das Urbild des Tartüffe*; *Zopf und Schwert*; and *Uriel Acosta*, which has been translated into Hebrew. For several years he edited the *Telegraph für Deutschland*, and since 1852 has edited a popular weekly paper, *Unterhaltungen am häuslichen Herd*. An edition of his miscellaneous writings was published in Leipzig in 1842-'50, in 4 vols.; a more complete edition of his collected works in 1845, in 12 vols.; and a separate edition of his earlier dramatical works in 1842-'54, in 8 vols.

GÜTZLAFF, KARL, a German missionary to China, born in Pyritz, Pomerania, July 8, 1803, died in Victoria, Hong Kong, Aug. 6, 1851. He was born of very poor parents, and notwithstanding his taste for the clerical profession, he was apprenticed to a belt maker at Stettin. A sonnet which he addressed to the king of Prussia led to his being admitted as a student into the missionary institute at Berlin. His first appointment was from the Dutch missionary society of Rotterdam, which sent him to Batavia in 1826. There he married a rich English lady, and during the two years that he remained in Java he mastered the Chinese language with the aid of some resident Chinese families. He then severed his connection with the Dutch society, and determined to go on his own account to China. Happening, in the summer of 1828, to fall in with an English missionary named Tomlin, stationed in Siam, he went with him to Bangkok, where he stayed 3 years, learning the Siamese language, assisting Mr. Tomlin to translate the New Testament into that tongue, and further perfecting himself in Chinese. Proceeding thence to China, he fixed his residence at Macao, where he co-operated with Morrison, Medhurst, and others, in their missionary labors, he being now in communion with the Anglican church. In 1831-'3 he made extensive observations along the coasts of China, Siam, Corea, and the Loo Choo islands, first in the disguise of a Chinaman, and afterward as interpreter and surgeon on board the British ship *Lord Amherst*. On the death of Dr. Morrison, in 1844, Gützlaff was invited to succeed him as interpreter to the British superintendency. The difficulties that had grown up between the Chinese and British had obstructed the progress of the missions. The circulation of works in the Chinese charac-

ter was forbidden, and the missionaries found themselves compelled to remove their presses to Singapore. For the same reason an attempt made by Gützlaff to visit the province of Fokien was unsuccessful, but he continued to exert himself in his civil capacity for the objects he had in view. Afterward he was appointed secretary to the British plenipotentiary, and finally superintendent of trade, which office he held till his death. In 1844 he originated a society, ostensibly Chinese, for the purpose of carrying Christianity into the interior through the medium of native agents, and in 1849 visited Europe in behalf of the project. His intimacy with the language and customs was of the greatest service to the British during their war with China, and especially in the negotiation of the treaty of peace at Nankin, May 29, 1842. Beside his translation of sacred works into various Asiatic languages, he wrote in English, "History of the Chinese Empire" (London, 1834), "China Opened" (London, 1838), and a "Life of Tao-Kuang" (London, 1851), &c.; and in Chinese, "Pro and Contra." Among his German works are *Allgemeine Länder und Völkerkunde* (Ningpo, 1843); *Geschichte des Chinesischen Reiches* (Stuttgart, 1847); and various others. His reports from China from 1840 to the end of 1846 were published in Cassel, and his Berlin lectures on his Chinese missions in Berlin, both in 1850.

GUY, THOMAS, an English philanthropist, born about 1648, died in London, Dec. 17, 1724. In 1660 he was apprenticed to a bookseller in London, and after his apprenticeship he commenced business with a capital of £200. Being a man of very parsimonious habits, he rapidly accumulated a fortune. He farmed the privilege of printing Bibles from Oxford university, and during Queen Anne's wars bought government securities at a depreciated rate. He also made large sums by buying South sea stock. He had engaged to marry a favorite servant maid, but for some trifling offence he broke his engagement, and repudiated her. From this period he determined to lead a life of celibacy, and to devote his property to eleemosynary purposes. The erection of the hospital at Southwark which bears his name cost £18,793, and the sum which he left for its endowment amounted to £219,499. He also built an alms house at Tamworth in Staffordshire, for 14 poor men and women, and bequeathed to it £125 a year; while to Christ's hospital, London, he left an annuity of £400 for ever. Esteemed an intensely avaricious and selfish man by his contemporaries, he yet dedicated more money to charitable objects than any other private individual on record in England. He also left £80,000 to his relatives.

GUYON, JEANNE MARIE BOUVIER DE LA MOTTE, a French mystical teacher and writer, born in Montargis, April 13, 1648, died in Blois, June 9, 1717. She was the daughter of Claude Bouvier, seigneur of La Motte Vergouville, and early displayed a religious turn of mind, which

was fostered by her parents, although they would not permit her to enter a convent as she wished to do. In 1664 she was married to M. Jacques Guyon, a man of family and property, but of uncongenial temper and 22 years her senior. Five children were born of this union, 2 of whom died young. M. Guyon died in 1676, and in 1680 Mme. Guyon removed to Paris, where she devoted herself to the education of her children and to charitable labors. At this period of her life she was afflicted with deep religious depression, under the influence of which she began a correspondence with a Barnabite priest named Lacombe, whose acquaintance she had formed some years before. The cheerful teachings of this person restored her peace of mind. "My soul," she writes in her memoirs, "was delivered from all its pains." She began now to speak of nature as wholly dead within her, selfishness extinguished, her intellect unperplexed, her heart pure, and her imagination fixed on God alone. She felt herself called to serve God in some extraordinary way. D'Aranthon, the bishop of Geneva, encouraged her to set out on a mission to the Protestants in the part of France contiguous to his diocese, and having committed the care of 2 of her children and her property to competent hands, reserving for herself only a small allowance, she removed in July, 1681, from Paris to Gex, a French town 12 m. from Geneva. Here she luxuriated for about 8 months in a kind of religious sentimentalism, engaging meanwhile in works of charity, and entering into close intercourse with Lacombe, whose convent was at Thonon, 24 m. distant. Lacombe was appointed by the bishop to be her spiritual director, but was in fact wholly subjected to her influence. The peculiar views on sanctification and other doctrines advanced by them soon brought them under suspicion of heresy, and they encountered so much opposition that Mme. Guyon removed to Thonon. Similar results were experienced here, and in 1684 both she and Lacombe were ordered by D'Aranthon to leave his diocese. She went then successively to Turin, Grenoble, Marseilles, Nice, Genoa, Vercell, and Grenoble again, where her instructions proved very attractive, but exposed her to persecution. During these journeys she composed her "Spiritual Torrents" and "Short and Easy Method of Prayer," and began her commentaries on the Bible. In 1686 she returned to Paris, where she spent some time in comparative retirement. She was sought out, however, as usual, by multitudes of persons, among whom were many of high rank. With the duchess of Beauvilliers, the duchess of Béthune, and the countess of Guiche, she organized meetings of ladies of rank for prayer and religious conversation. The duke of Beauvilliers and the duke and duchess of Chevreuse were among her disciples. Shortly before this the writings of Michael de Molinos, the originator of the party called "quietists," had been condemned at Rome as heretical, and it was soon perceived that the teachings of

Mme. Guyon were but little different from his. A vigorous movement was begun for their suppression, under the leadership of Mme. Guyon's half brother La Motte, a Barnabite priest. The first step was the imprisonment in the Bastille of Lacombe, whose preaching was producing extraordinary effect, and this was soon followed by the arrest of Mme. Guyon herself by royal order, and her confinement in the convent of St. Marie (Jan. 1688). At the end of 8 months she was released through the intercession of Mme. de Maintenon. Soon after this she met Fénelon, who became deeply engaged in her instructions, while she was equally interested that he might be brought to her own views. Mme. de Maintenon was likewise fascinated with her, and permitted her to disseminate her opinions at the female seminary of St. Cyr. At the suggestion of a brother of the poet Boileau she wrote an apology for the "Method of Prayer," which renewed the outcry against her, so that she found it expedient to remain for a while in the strictest seclusion, and resolved to submit her case to Bossuet, bishop of Meaux. A royal commission, of which Bossuet and Fénelon were both members, examined her writings, and a few passages were marked out as erroneous. To this decision Mme. Guyon submitted; but Bossuet went still further, and, to counteract the effect of the "Method of Prayer," wrote a treatise on the same subject which embodied severe reflections upon Mme. Guyon's character and conduct. It was the refusal of Fénelon to lend his signature to this work which led to the rupture between the two illustrious prelates. (See FÉNELON.) Meanwhile Mme. Guyon was imprisoned in the castle of Vincennes, and thence removed to the Bastille and subsequently to Vaugirard, where she was confined in a convent. In order, it is said, to prejudice the court of Rome against Fénelon, whose "Maxims of the Saints," a treatise designed to favor Mme. Guyon's doctrines, was then under examination by the pope, a letter was obtained from Lacombe, imprisoned at Vincennes, in which he exhorted Mme. Guyon to repent of their criminal intimacy. There is no doubt that the intellect of the enthusiast had been impaired by his confinement, and in fact he died insane not long afterward. Nevertheless, on the strength of this accusation, Mme. Guyon was sent back to the Bastille, her son was dismissed from the army, and some of her friends were banished. Her virtue, however, was acknowledged in the assembly of the French clergy at St. Germain in 1700, and in 1702 she was released from prison and banished to Diziers, where and in the neighboring city of Blois she passed the rest of her life in perfect retirement, professing on her death-bed an unhesitating faith in the Roman Catholic church and all its dogmas. The heresies of which she was suspected consisted mainly in her doctrine of sanctification by faith, and of that complete repose of the soul in God and identification of the will with the will of God which quietists call

the "fixed" or "continuous state," and which is fully described in the "Spiritual Guide" of Molinos. She charged her opponents with having interpolated passages in her works and forged several writings which bore her name. Her principal works are: *Moyen court et très-facile pour l'oraison* (Lyons, 1688-'90); *Les torrents spirituels*, first printed in an edition of her *Opuscules spirituels* (Cologne, 1704); *Les livres de l'Ancien et du Nouveau Testament, traduits en Français, avec des explications et des réflexions qui regardent la vie intérieure* (20 vols. 8vo., Cologne, 1713-'15); *Discours Chrétiens et spirituels* (1716); *Lettres Chrétiennes, &c.* (4 vols. 8vo., 1717); collections of hymns, &c.; and her autobiography, written during her imprisonment, and published after her death (*Vie de Mme. Guyon, écrite par elle-même*, 8 vols. 12mo., Cologne, 1720). This work is silent upon some of the most important incidents of her life, and it has been supposed that it was actually written by Poiret from her papers. Many of her hymns were translated by Cowper.—See the "Life and Religious Opinions and Experience of Madame de la Motte Guyon," by Thomas C. Upham, D.D. (2 vols. 12mo., New York, 1847).

GUYON, RICHARD DEBAUFFÉ, a general in the service of Hungary and Turkey, born in Walcot, near Bath, England, March 31, 1813, died in Constantinople, Oct. 1856. He received his early education at Bath, served in the Surrey militia and against Don Miguel in Portugal, and in 1832 entered a Hungarian hussar regiment in the Austrian army. He was made lieutenant, and subsequently became aide-de-camp to Baron Splényi, the commander of the Hungarian noble life guards, whose daughter he married in 1838. Retiring from service, he lived on his estate in Hungary until the summer of 1848, when he again entered the army in defence of his adopted country. He was made major of a battalion of honvéds, contributed to the defeat of Jellachich at Sukoró (Sept. 29), distinguished himself at the battle of Schwechat near Vienna (Oct. 30), where he stormed the village of Manns-wörth, and was made colonel by Kossuth, received command of the unsuccessful expedition against Simunich, and fought heroically, though unfortunately, against the overwhelming force of that general at Tyrnau (Dec. 18). He then joined Görgey on his retreat, and shared in his winter campaign, beat back the Austrians at Ipolyág (Jan. 10, 1849), was defeated at Windschacht (Jan. 21), saved his division by a bold march, was surprised, but repelled the enemy at Igló (Feb. 2, 8), and forced the defiles and heights of Mount Branyiszko (Feb. 5). He denounced the schemes of Görgey, from whose army he was therefore removed at the beginning of the spring campaign. Made general by Kossuth, he received the command of the hard-pressed fortress of Comorn, which he entered after some bold adventures, with a few hussars, before its rescue by Görgey's army. In the following summer he operated at the head of a sep-

arate corps in the south of Hungary against Jellachich, whom he defeated at Kis Hegyes (July 14), and subsequently joined the army of Dembinski, sharing in its defeats at Szöreg (Aug. 5) and before Temesvár (Aug. 9), the latter of which sealed the fate of the revolution. He fought in its last skirmishes before retiring with Kossuth to Turkey, where the fame of his bravery (for which, and in allusion to his English descent, he was often called Richard the Lion-hearted) soon procured him a new field of military activity and the dignity of pasha, in spite of his refusal to adopt the Mohammedan religion. He received the name of Khurshid Pasha, and was sent to Damascus, and after the outbreak of the Russian war in 1853 to Kars, where he acted for some time as chief of the staff and president of the military council.

GUYOT, ARNOLD HENRY, a writer on physical geography, born near Neuchâtel, Switzerland, Sept. 8, 1807. After the usual course of collegiate studies at Neuchâtel, he entered the gymnasium of Stuttgart, and afterward of Karlsruhe, where he formed an intimate friendship with Agassiz, and began with him the study of natural science. He afterward studied theology for 4 years at Neuchâtel and Berlin; but his taste for natural science, fostered by the example and the instructions and lectures of Humboldt, Steffens, and Karl Ritter, gradually led him to devote himself entirely to the study of physics, meteorology, chemistry, mineralogy, zoology, and botany. In 1835 he took the degree of doctor in the university of Berlin, and proceeded to Paris, where he resided 5 years, passing the winters in severe study and the summers in scientific excursions through France, Belgium, Holland, and Italy, examining the characteristic physical features of those countries. In a tour of Switzerland in 1838, he ascertained and announced in a communication to the geological society of France several of the most important laws concerning the glaciers. He first discovered the laminated structure of the ice, the motion of the central portion being more rapid than that of the borders, as in streams of water. He showed that the motion of the glacier is due to the displacement of its molecules, which constitute its plasticity and explain its moulding. These discoveries were fully confirmed and illustrated by the investigations of Agassiz, Forbes, and others, several years afterward. Mr. Guyot next investigated the distribution of erratic bowlders, in order to solve the question of the mode of their transportation. De Saussure, Von Buch, Escher, and De Charpentier had made numerous observations on this subject, but the extent and true limits of these great *effluvia* of rocks from the bosom of the Alps were not accurately known. During 7 successive summers Mr. Guyot traced them on both sides of the central Alps, in Switzerland and Italy, over a surface 800 miles long and 200 miles wide, and delineated 11 different regions of rocks. Their vertical limits and the laws of their descent were determined by means

of more than 8,000 barometrical observations; and the characteristic species of rock of each basin were tracked step by step to their source, often in the midst of the highest regions of ice and snow. A collection of more than 6,000 specimens of rocks was made as vouchers for the results. The absolute coincidence of the various laws of distribution with the laws of the moraines on the glaciers was made fully evident. The full details of these investigations were announced to form the second volume of the *Système glaciaire* by Agassiz, Guyot, and Desor, the first volume of which was printed in Paris in 1848; but the political disturbances of that epoch and the removal of Mr. Guyot to the United States prevented its publication. The main results, however, are to be found in the *Bulletin de la société des sciences naturelles de Neuchâtel*, and in D'Archiac's *Histoire de la géologie*; and they have since passed into various scientific manuals. A fine topographical map of the subaqueous basin of the lake of Neuchâtel, believed to be the first of the kind ever published, was Mr. Guyot's next work. In 1839 the academy of Neuchâtel was established in some degree on a university basis. In this institution, which numbered Agassiz among its professors, Mr. Guyot occupied from 1839 to 1848 the chair of history and physical geography. In the latter year a political revolution in Neuchâtel broke up the institution, and he was induced by Agassiz to remove to the United States. He resided for several years at Cambridge, Mass., occupying himself with the study of the physical geography of the American continent, and occasionally delivering lectures on his favorite subjects. He first became extensively known in this country by a course of lectures delivered in Boston in the winter of 1848-'9 in the French language, on the relations between physical geography and history. These were translated by Prof. Felton of Harvard college, and afterward collected into a volume under the title of "Earth and Man" (Boston, 1849). The work has had a large circulation in the United States, where it is extensively used as a text book in higher schools, and 5 rival editions of it have been published in England. For several years subsequent to its publication Mr. Guyot was employed by the Massachusetts board of education to deliver lectures in the normal schools of the state and before the teachers' institutes, and in this way, addressing annually 1,200 or 1,500 teachers, he has exercised an important influence in reforming the method of teaching geography. He has also been employed by the Smithsonian institution to organize a system of meteorological observations, for which he prepared an extensive series of practical tables. For the last 10 years he has devoted the summers to an investigation of the physical structure and elevation of the Alleghany system of mountains. Four summers were given to the barometrical measurement of the White and the Green mountains of New England and the Adirondac mountains of

New York; and 8 summers to the Black and the Smoky mountains of North Carolina. He was the first to determine the true height of Mt. Washington, in 1851; of the Black mountains, in 1856; and of the Green mountains, in 1857. By these investigations he has ascertained that there are more than 20 peaks in the Black and Smoky ranges higher than Mt. Washington. Beside the "Earth and Man," Mr. Guyot has published large physical maps of the globe, and has in preparation a general physical atlas. In 1855 he was appointed professor of physical geography in the college of New Jersey at Princeton, where he has since continued to reside.

GUYTON DE MORVEAU, LOUIS BERNARD, a French chemist, born in Dijon, Jan. 4, 1737, died in Paris, Jan. 2, 1816. While yet a minor he was appointed deputy attorney-general at the parliament of Dijon, which post he held till 1782. He devoted his leisure to scientific pursuits, caused the states of Burgundy to establish in 1774 public lectures upon various branches of natural philosophy, and himself undertook the professorship of chemistry. In conjunction with Maret and Durande, he published in 1777 *Éléments de chimie théorique et pratique*, and also published annotated translations of several treatises of Bergman, Scheele, and Black. As early as 1778 he had used chlorine as a general disinfecting agent, and made the results of his experience known in his *Traité sur la désinfection de l'air* (1801). He suggested in 1782 the plan of a new chemical nomenclature, which was at once adopted by Lavoisier and others, who, in conjunction with him, perfected the original idea and reduced it to the shape it still retains. Meanwhile Guyton wrote the *Dictionnaire de chimie*, for the great *Encyclopédie méthodique*. During the revolution, he was elected (1791) deputy to the legislative assembly, and afterward to the convention, where he voted for the death of Louis XVI. He was among the promoters of the polytechnic school, in which he was afterward professor and director. He was administrator of the mint from 1800 to 1814, and he favored the new monetary system.

GUZERAT, GUZZERAT, GUJERAT, GUERAT, GUJRAT, or GOOJERAT (Hindoo, *Gurjara Rashtra*), a large province of Hindostan, under the Bombay presidency, between lat. 20° and 24° 45' N., and long. 69° and 74° 20' E., bounded N. by the gulf of Cutch and Rajpootana, E. by Candeish and Malwa, S. by the gulf of Cambay, the Arabian sea, and certain British collectorates in the Bombay presidency, and W. by Cutch and the sea; area, 41,536 sq. m.; pop. estimated at 2,000,000. It comprehends the peninsula of Cattywar, the dominions of the guicowar, and several petty native states. The western Ghauts form its E. boundary as far N. as lat. 21° 28', when they turn eastward. The W. extremities of the Sautpoora and Vindhya mountains extend a short distance into the province. The central regions are level and open. The principal rivers are the Subbermuttee, Mhye, Nerbudda, Taptee, and western Banass.

The mineral resources are small, and confined chiefly to iron and fine carnellians. The lion, tiger, leopard, wolf, hyena, antelope, deer, nylgau, camel, and buffalo are common. The staple crop is cotton, which occupies about  $\frac{1}{4}$  of the tilled land. Rice is much cultivated, and wheat, barley, bajra (the principal food of the poorer classes), gram, &c., are abundant. On an island in the Nerbudda there is a famous banian tree, which was once capable of shading an army of 7,000 men, and, though much reduced in size, still covers an area of 3 or 4 acres. The inhabitants comprise Mahrattas, Rajpoots, Parsees, Coolies, Koombies (an agricultural tribe), Dungs (who subsist chiefly by the chase and fishing), Cattles (who predominate in Cattywar), Jains, Bheels, Charuns, and Bhats. Hereditary slavery is recognized in some parts of the country. The principal towns are Baroda, Dongurpoor, Cambay, &c.—Guzerat formed part of the Mohammedan empire of Delhi, and, after having been separated from it during the Togluck dynasty was reannexed by Akbar in 1572, and remained a dependency until 1724. The Mahratta peishwa and the guicowar held large possessions in Guzerat, but the authority of the latter only is now recognized, the peishwa's territory having been ceded to the British.

GWALIOR, or GUALIOR, a part of Hindostan, forming the possessions of the family of Sindia. The Gwalior territories consist of several detached districts, the principal of which is bounded N. E. by the Chumbul, which divides it from the British districts of Agra and Etawah, E. by Bundelcund and the British districts of Saugor and Nerbudda, S. by the native states of Bhopal and Dhar, W. by those of Rajghur, Jhalawur, and Kotah, and N. W. by the Ohumbul, separating it from Dholpore and Rajpootana; length from N. to S. 246 m., breadth 170 m. The extreme points of the Gwalior territory are in lat.  $21^{\circ} 8'$  and  $26^{\circ} 50' N.$ , and long.  $74^{\circ} 45'$  and  $79^{\circ} 21' E.$  The area of the whole is 88,119 sq. m. The population is estimated at 3,200,000, and consists of Mahrattas, who are the ruling class, and of Boondelas, Jants, Rajpoots, and Mussulmans. Brahmins are very numerous. The principal rivers of the Gwalior country are the Taptee, Nerbudda, Ohumbul, and Sindie. The surface of the country is level in the N., in the centre hilly, and in the S. it comprises portions of the Vindhya and Sauppoora mountains. The climate of the N. part is hot, and during the rainy season very unhealthy. The S. part, from its elevation, has a mild and healthful climate. In January and February the thermometer falls sometimes 3 or 4 degrees below the freezing point; in the heat of summer it sometimes rises to  $100^{\circ}$ . The chief cities of the Gwalior territories are Gwalior, Oojein, and Boorhanpoor.—The Sindia dynasty was founded in the first half of the 18th century by Ranjee Sindia, the hereditary chieftain of a small rural district, who before his death in 1750 had become a personage of considerable importance in the west of Hindostan. His natural son Madhaji Sindia,

who succeeded him, was an able and ambitious man, who greatly enlarged the possessions of the family, and in 1782 by the treaty of Salbye, concluded between the East India company and the peishwa, was recognized as a sovereign prince. He maintained a large and well appointed army, organized and disciplined by French officers; and at the time of his death in 1794 his dominions included Delhi on the N., and extended to the river Taptee on the S., and from the Ganges on the E. to the gulf of Cambay on the W. His successor, Dowlut Row, became involved in war with the British, by whom his armies were totally defeated in 1803, and a considerable part of his territories taken from him. He died in 1827, and was succeeded by Mugut Rao, on whose death without children in 1848 the country fell into confusion and anarchy, which led to the interposition of the British, who after several severe battles occupied the capital with a large force, restored order, and established the authority of the legitimate sovereign, Bhagerut Row Sindia, a boy 8 years of age, who attained his majority in 1853, and is still sovereign under the title of maharajah. By a treaty concluded Jan. 18, 1844, it was stipulated that Sindia might maintain a military force not exceeding 9,000 men. Beside this, he was bound to maintain and pay about an equal number of sepoys organized and commanded by British officers. This last body was termed the Gwalior contingent, and was mainly stationed at the important fortress of Gwalior. During the great sepoy mutiny in 1857 it joined in the revolt, murdered or put to flight its European officers, and demanded that Sindia should lead them against the British at Agra. The maharajah, however, remained faithful to the British throughout the revolt, and exerted himself to the utmost to prevent the contingent from taking the field. He kept them under control for some months, partly by persuasion, partly by threats. They at length took an active part in the war, and, being well armed and disciplined, were an important accession to the rebel cause. In May, 1858, the mutineers, commanded by Tantia Topee and Row Sahib, nephew of Nena Sahib, having been defeated and hard pressed by Sir Hugh Rose at Calpee, suddenly marched upon Gwalior, intending to make its celebrated fortress a place of refuge. Sindia met them with his native troops a few miles from Gwalior, and gave them battle, June 1. The right and left wings of his army went over to the mutineers early in the battle, and his guards, who remained faithful, were put to flight, with the loss of more than half their number. Sindia himself, hotly pursued by a troop of cavalry, fled to Agra. The rebels took possession of the city of Gwalior and established a government. They declared Sindia dethroned, and made Row Sahib maharajah of Gwalior in his stead. Nena Sahib was proclaimed peishwa or chief of all the Mahratta princes. Sir Hugh Rose made a prompt march from Calpee with the British forces, reached Gwalior on June 16,

and, after 4 days' hard fighting, routed the mutineers and made himself master of Gwalior and its fortress. On June 20 Sindia was reinstated on his throne with great pomp; and to mark the grateful respect of the British government for his faithfulness as an ally, the governor-general ordered the event to be celebrated by a royal salute at all the principal stations throughout India.—**GWALIOR**, a town and fortress, capital of the above country, in lat.  $26^{\circ} 18' N.$ , long.  $78^{\circ} 15' E.$ , 65 m. S. from Agra, 175 m. S. from Delhi, and 772 m. N. W. from Calcutta; pop. about 80,000. The town is situated at the foot of a high rock crowned by the fortress, and is of considerable size, having a street a mile long and many good houses of stone. It contains the tomb of Muhammad Ghous, a famous saint of the time of the emperor Akbar, a very beautiful building of white sandstone, with a cupola covered with blue porcelain tiles. Gunpowder and fireworks are made here, and there are foundries for the casting of cannon. The rock, on the summit of which the fortress is built, is of sandstone, capped in some places with basalt. The face of the rock is perpendicular, and in some places the upper part considerably overhangs the lower. The greatest length of the rock from N. E. to S. W. is  $1\frac{1}{2}$  m., the greatest breadth 300 yards. The height where it is greatest at the N. end is 342 feet. On the E. face several colossal figures are sculptured in bold relief. The entrance to the fortress is toward the N. end of the E. side; first, by means of a steep road, and higher up by steps cut in the face of the rock, of such a size and inclination that elephants can ascend them. This staircase is protected on the outer side by a massive stone wall, and is swept by several cannon pointing down it. The passage to the interior is through a succession of 7 gates. It is said that to fully garrison this place would require 15,000 men. The fort contains a palace and two remarkable pyramidal buildings of red stone in the most ancient style of Hindoo architecture. The fortress of Gwalior was built in 778 by Surya Sena, rajah of the adjacent territory. In 1028 it was unsuccessfully besieged by the celebrated conqueror Mahmood of Ghuznee. After many sieges and passing through various hands, it was taken by stratagem by the emperor Baber in 1526. Subsequently by the emperor Akbar it was made a state prison for captives of importance. After the dismemberment of the empire of Delhi it fell into the hands of the Sindia family, from whom it was taken by the English in 1779. It was recovered by Sindia in 1784, was again taken by the British in 1803, and again restored in 1805. Subsequently to Jan. 1844, it was garrisoned by the Gwalior contingent commanded by British officers.

**GWILT**, JOSEPH, an English architect and author, born in Southwark, Jan. 11, 1784. He is chiefly distinguished as a writer on professional subjects and the fine arts generally. His most important works are: "Rudiments of

Architecture, Practical and Theoretical," a translation of Vitruvius, and an "Encyclopedia of Architecture" (8d and enlarged ed. 1854). The principal edifices of his erection are Markree castle, near Sligo, and Charlton church, near Woolwich, the latter in the Byzantine style.

**GWIN**, WILLIAM MACKENDEY, U. S. senator from California, born in Sumner co., Tenn., Oct. 9, 1805. He was educated at Transylvania university, Lexington, Ky., studied medicine, and settled at Vicksburg, Miss. In 1833 he was appointed by President Jackson U. S. marshal for the state of Mississippi, which position he held until the accession of Gen. Harrison to the presidency in 1841. In that year he was elected to congress, where he served but one term, declining a reelection in 1843. In 1847 he was appointed by President Polk to superintend the erection of the custom house at New Orleans. In 1848 he removed to California, and in 1849 was elected a delegate to the convention to form a constitution preparatory to the admission of California into the Union as a state. A state government having been organized, Mr. Gwin and Col. Fremont were elected U. S. senators in 1850. When the state was admitted into the Union, the two senators drew lots to determine which should have the long and which the short term, and Mr. Gwin drew the term ending March 3, 1855. Owing to dissensions in the democratic party in California, no one was chosen to succeed him, till in Jan. 1857, he was again elected for the term ending March 3, 1861.

**GWINNETT**, a N. co. of Ga., bounded N. W. by the Chattahoochee river, and drained by head waters of the Appalachee, Yellow, and Ulocauhachee; area, 550 sq. m.; pop. in 1853, 11,618, of whom 2,385 were slaves. It is rich in minerals, including gold, which is found on the Chattahoochee, iron, antimony, and superior granite. The surface is hilly, and the soil of the river bottoms fertile. The productions in 1850 were 486,927 bushels of Indian corn, 102,056 of oats, 78,307 of sweet potatoes and 2,581 bales of cotton. There were 3 grist mills, 8 saw mills, 2 woollen factories, 8 tanneries, 88 churches, and 800 pupils attending public schools. Value of real estate in 1856 \$1,345,948. Formed in 1818, and named in honor of Button Gwinnett. Capital, Lawrenceville.

**GWINNETT**, BURTON, one of the signers of the declaration of independence, born in England about 1732, died in Georgia, May 27, 1777. He emigrated from Bristol to America in 1770, engaged for 2 years in trade in Charleston, and then purchased a tract of land on St. Catharine's island, Ga., and devoted himself to agriculture. He became conspicuous in 1775 by his maintenance of the colonial rights, was elected a representative to congress in Feb. 1776, and reelected for the following year, and in 1777 became president of the provincial council, the highest station in Georgia. He planned a military expedition against East Florida, which he refused to intrust to his rival Gen. McIntosh, whose official

rank entitled him to command it, and which resulted disastrously. This event, aggravated by other disturbances, led to a duel between him and Gen. McIntosh, in which he was mortally wounded.

GWYNN, or GWINN, ELEANOR, one of the mistresses of Charles II., born in London, Feb. 2, 1650, died there in Nov. 1687. It is stated that her father, Capt. Thomas Gwynn of the army, was of an ancient Welsh family; but she is said to have been born in a night cellar in the Coal Yard, Drury Lane, and she was reared in the lowest haunts of vice. Her first employment was that of an orange vender, in which capacity she wandered from tavern to tavern, entertaining the company with her songs. She was beautiful, gay, and yielding; and after being the mistress successively of Hart and Lacy, the actors, she went in her 16th year upon the stage, and became one of the most popular actresses of the time in light, humorous parts, especially where singing and dancing were introduced. Dryden thought highly of her talents, and always selected her for agreeable parts. In tragedy, Pepys tells us, she acted "most basely." The same gossiping diarist gives several highly colored descriptions of the personal attractions of "pretty, witty Nell," as he calls her. About 1667 she became the mistress of Lord Buckhurst, who, it is said, for a political reward, surrendered her to his royal master. She remained on the stage until 1671, although her intimacy with Charles, which lasted until his death, commenced in 1669. Upon becoming his acknowledged mistress she was called Madam Ellen, had an establishment of her own, and was even made a lady of the privy chamber to Queen Catharine, and admitted to the best society of the period. The king at first refused her not immoderate demand of £500 a year, although she is said subsequently to have cost him upward of £60,000 in 4 years. Of all his mistresses Nell was the only one who remained faithful to him, and the only one perhaps who has won any sympathy or forgiveness from posterity. Her frailty and a tendency to hard swearing seem to have been her chief faults. She was merry and open-hearted, generous to profusion, and in her prosperity ever mindful of her old friends, particularly those of the theatrical profession. Dryden, Lee, Otway, and Butler are reported to have been liberally aided by her. She instigated Charles to erect Chelsea hospital for disabled soldiers, presenting the land on which the building stands, and her health used regularly to be drunk by the pensioners on the anniversary of Charles's birthday. She was even popular with the public, as the supposed representative at court of Protestant interests. Charles, to his credit, appreciated her good qualities, and among his last words were: "Let not poor Nelly starve." She bore him 2 sons, from one of whom the present duke of St. Albans is descended; the other died in infancy. She is believed to have led a virtuous life after the death of the king,

and her funeral sermon was preached by Dr. Tenison, afterward archbishop of Canterbury. The "Memoirs of the Life of Nell Gwynn, Mistress to K. Charles II., by John Seymour, Comedian" (8vo., London, 1752), is a panegyric on Nell. Another memoir by Peter Cunningham was published in 1850 (12mo., London).

GYGES, the first Lydian king of the Mermnadæan dynasty. He was originally a chief officer at the court of his predecessor Candaules. According to Herodotus, Candaules was proud of the beauty of his queen, and insisted that Gyges should conceal himself in her chamber in order to behold her unveiled charms. Gyges reluctantly obeyed the mandate of his master, and was seen by the queen as he glided from her apartment. She was filled with indignation at this insult, and the next morning, sending for Gyges, she gave him the alternative of being immediately put to death himself, or of becoming the assassin of her husband, and the possessor of his kingdom and wife. To save his own life Gyges chose the latter alternative, and after slaying his sovereign he shared the Lydian throne with his former mistress. The people, it is said, were at first indisposed to submit to his authority; but the Delphian oracle having declared in his favor, they ultimately acquiesced. His reign commenced about 724 B. C., and lasted 38 years. The wealth of Gyges, like that of his successor Croesus, was proverbial.—According to Plato's well known fable, Gyges was the shepherd of Candaules. The earth having opened during an earthquake, he descended into the abyss, and found there a great brazen horse, in the hollow interior of which was a corpse with a golden ring; carrying away the ring, he accidentally discovered that by means of it he could render himself invisible at will, and he took advantage of this power to destroy Candaules and usurp his throne without personal peril.

GYLONGS, priests of Buddha in N. E. Hindostan. They profess celibacy, often live in monasteries, and are forbidden to till the earth; but trade and public offices are both open to them, and their duties consist of little beyond the study of sacred books and officiating at the burning of the dead. They number about 5,000. Their ceremonial observances differ widely from those of other nations; their temples, which are small square structures containing an image of Buddha, are never opened for service, and public worship is performed by processions around the outside.

GYMNASIUM, a term applied in Germany to all institutions for education which occupy a middle place between elementary schools and universities. The German gymnasia are descendants of the so-called cloisters or cathedral schools of the middle ages, which were at first solely intended to prepare youth for church service, but which gradually came to embrace all branches of learning then known. The establishment of universities in the 13th and 14th centuries, the rapid growth of the cities,



of trade, and of a middle class, called into existence numerous city schools which took the place of those of the cloisters. The reformation reformed also those schools, a higher and more genial class of studies, especially of the classics, being introduced through the efforts of Melancthon and others. The social dissensions and disasters which followed the reformation inflicted great injury on that progressive education which was the principal hope with all its great men; and at the end of the 17th century mystical or pietistic theology, which taught the vanity of worldly wisdom, and especially of heathen art, had such effect on these schools as to seriously weaken the classical studies pursued at them, without substituting any thing of equivalent value. In Prussia, at the beginning of the present century, a general reform of these schools was instituted, which was gradually developed and introduced all over Germany. There has always been a strife in Germany, whether the "real" or mathematical and practical influence, or the "humane" or literary influence, as derived from a study of the classics, should prevail in gymnasia. In the present system the classics have by far the upper hand, liberal allowance being however made for the study of mathematics, physics, and natural history. Scholars are also taught the principles and literature of their native language to an extent unknown in France, England, or America. At the head of a gymnasium is the rector or director, followed by the different teachers. The pupils are divided according to their standing into classes termed the *prima*, *secunda*, *tertia*, &c., the first being the highest, each of which has also its divisions, such as the upper *prima* and under *prima*. There is a half-yearly examination, at which time also the relative grades of industry and merit are determined, promotions into higher classes made, and permissions to leave for the university awarded. With these there is also a valedictory delivered by a graduate, and a reply made by one of those remaining. The generic name for these schools is gymnasium, but they are generally known by names derived from peculiar variations in discipline or constitution, such as *lyceums*, *Pädagogien*, and *land*, *prince*, *cathedral*, or *cloister schools*. Sometimes they take the name of their founders, as the *Christianæum*, the *Fridericianum*, or *Johanneum*, or perhaps that of the cloister to which they belong, as the *gymnasium of Our dear Lady*, or of the *Gray Cloister*. Great efforts were once made, and with partial success, to make physical education a part of every gymnastic course.—See Friedrich Gedike, *Ueber den Begriff einer gelehrten Schule* (Berlin, 1802); Thiersch, *Ueber gelehrte Schulen* (Stuttgart, 1826); Deinhardt, *Der Gymnasialunterricht* (Hamburg, 1837); K. von Raumer, *Geschichte der Pädagogik* (Stuttgart, 1848-'52); Köchly, *Ueber das Princip des Gymnasialunterrichts* (Dresden, 1845), and *Zur Gymnasialreform* (1846). (See GYMNASTICS.)

- GYMNASTICS (Gr. *γυμνος*, naked), a system of exercises which develop and invigorate the body. If properly directed, gymnastics will enlarge and strengthen every muscle of the trunk, arms, and legs, will expand the chest so as to facilitate the play of the lungs, will render the joints supple, and will impart to the person grace, ease, and steadiness of deportment, combined with strength, spring, and speed. But an injudicious mode of exercise will generally confirm and aggravate those physical imperfections for which a remedy is sought. Though athletic feats were at first performed by each individual according to his own notions, and were encouraged among the youth as combining amusement with exercise, they were at length reduced to a system, which in Greece formed a prominent feature in the state regulations for education; and as the nature of the warlike weapons rendered the development of physical force a subject of the highest military importance, those athletic sports were continued during manhood, and public games were consecrated to the gods, and were conducted with the greatest ceremony. The earliest mention we can find of gymnastic sports is in Homer's *Iliad*, book ii., where the Greeks are described as contending at javelin throwing and quoits; and again in book xxiii., when Achilles instituted games in honor of Patroclus, and distributed prizes to the victors for boxing, wrestling, quoiting, chariot racing, &c. Plato tells us that just before the time of Hippocrates gymnastics made a part of medical study, as being suitable to counteract the effects of indolence and luxurious feeding, and that at length they became a state matter reduced to a system and superintended by state officers. The first public gymnasia were built by the Lacedæmonians, which were imitated at Athens; where, in the walks belonging to one of them called the *Academia*, Plato instructed his pupils, and in another named the *Lyceum* Aristotle taught. At Athens a chief officer (*γυμνασιάρχης*) superintended the whole establishment; the *ἐφοράρχης* superintended only the most athletic exercises; medical officers were in attendance, whose duty it was to prescribe the kind and extent of the exercise; the *παιδορρίβης* assisted and instructed the pupils, who commenced with easy exercises, from which they were gradually advanced to the more violent, till they reached the highest degree of agility and strength. Baths were attached to the gymnasia; the system most recommended was to take first a hot bath, and then immediately to plunge into cold water. Plato and Aristotle considered that no republic could be deemed perfect in which gymnasia were neglected as part of the national establishments. The Spartans were the most rigid in exacting for the youth a gymnastic training; even the girls were expected to be good gymnasts, and no young woman could be married till she had publicly exhibited her proficiency in gymnastics. Honorable rewards and civic distinctions were publicly bestowed on the vic-

tors in the games; the rewards were styled *αθλα*, wherefore those who contended for them were termed *αθληται*—athletes. The exercises for the pupils in the gymnasia consisted of dancing, or rather a sort of tumbling, and war dances; running, much recommended for both sexes; leaping, height and breadth, and sometimes springing from the knees having weights attached to the body; retaining the equilibrium while jumping on slippery skins full of wine, the feet being naked; wrestling for the throw, or to keep the other undermost after the throw; boxing, confined like the preceding nearly exclusively to the military and athlete. The boxer either held the hands open, or he clenched brazen or stone spheres, or wore the *caetus* or leathern band studded with metal knobs bound round his hands and wrists; there was also a mixed practice of boxing and wrestling called *παικματιον*. The pitching of the quoit underhanded was much practised; a variation of the quoit was found in the *ακντες*, not unlike a dumb-bell, which was thrown by one to another, who caught it, and then pitched it to a third, and so forth; it was also adopted in extension motions, and was held in the hand with arm extended for a long time. Javelin hurling, overhanded, was practised by both sexes; also throwing the bar. Riding, driving, swimming, rowing, swinging, climbing ropes, standing erect for a long time in one position, the holding of the breath, shouting, shooting the arrow, &c., were also taught to the youth.—Modern gymnastics differ considerably from the exercises of the ancients. During the middle ages the knightly amusement of the tournament absorbed nearly every other sport except the play of the quarterstaff, archery, foot racing, and wrestling, which were partially practised in a few places; so that gymnastics fell nearly into disuse till Basedow, in 1776, at his institution at Dessau, united bodily exercises with instruction, which example was subsequently followed by Salzmann at his institute, and from this small commencement the practice gradually spread. In the latter part of the 18th century gymnastics were extensively introduced into Prussian schools by Guts-Muths, who wrote several works on the subject; and about 1810 the system was still more widely spread by Jahn, who may be regarded as the founder of the present *Turnvereine*. Prussia being at that time impatient under Napoleonic domination, Jahn conceived the project of bringing together the youth for the practice of gymnastic exercises, and at the same time to indoctrinate them with patriotic sentiments which might be made available to expel the French from Germany. The Prussian government favored the plan, and in the spring of 1811 a public gymnastic school or *Turn-Platz* was opened at Berlin, which was quickly imitated all over the country. On Feb. 8, 1813, the king of Prussia called the citizens to arms against the French, when all those old enough to enter the military service joined the national cause, and performed signal ser-

vice. Jahn himself commanded a battalion of Lützow's volunteers, and after the peace returned to his gymnastic schools. When, however, there was no longer any reason to dread Napoleonic invasion, the government of Prussia, regarding the meeting of patriotic young men as a likely means of spreading liberal ideas, closed the gymnastic schools, and Jahn was imprisoned. In some other countries, however, the system introduced by Jahn was eminently successful, especially in England, Switzerland, Portugal, and Denmark. In the first it was introduced into female education under the name of callisthenics, when systematized exercises were added to hoop trundling, skipping ropes, dumb-bells, &c., already usual among the girls, and to horse riding, archery, and other healthy outdoor exercises among the women. (See CALLISTHENICS.) The masculine sports of cricket, foot ball, quoits, boxing, wrestling, base ball, leap-frog, foot racing, &c., have been for centuries enjoyed by the boys of England, in the play grounds attached to the schools. In 1848 the political condition of Europe enabled the turnvereins to be reorganized, and the German emigration to the United States carried that institution with it. The first society was formed in New York, but other similar associations soon spread all over the United States. The organization as at first established was confined to the practice of bodily exercises conducive to physical development; but it soon assumed a higher scope without neglecting its original object; libraries were collected, schools were established, a newspaper (*Turnzeitung*) was founded, and various arrangements were made for the diffusion of useful knowledge and for mental culture. Thus the turnvereins of the United States tread closely in the track of the Academy of Athens; and when we consider the intimate connection between mind and body—how the suffering and the well-being of the one are affected by the condition of the other—too much attention can hardly be paid to the mingling of physical with mental improvement. The several local organizations of the turnverein hold annually a general meeting by means of delegates for the consideration of matters of common interest; they also have an annual festival attended by portions of the several organizations, wherein are exhibited feats of strength, agility, swimming, military manoeuvres, rifle shooting, sword play, &c. There are, moreover, several local festivals every year in the respective districts. The practice of gymnastics is becoming very general throughout the United States, both for the youth in schools and for the citizens.—The following are the chief modern exercises and appliances, some of which are suitable for both sexes: 1. Extension motions, tending to expand the chest and give free play to the lungs; also to render the limbs and body supple, and to impart to the person ease, grace, and steadiness. Stand upright, with knees straight and arms by the side; turn outward the palms of

the open hands, keeping the arms straight; raise the arms direct to the front of the respective shoulders, and then, keeping the palms open and uppermost, the head and body erect and steady, bring the hands at the height of the shoulders gradually and without a jerk as far back as possible. The same may be done with dumb-bells. Raise the arms above the head with the hands open to the front, and the thumbs touching; bend slowly forward, keeping the knees straight, the head being all the time between the arms, so that the entire spine to the end of the neck may bend; do not force the bend, for it will gradually improve till at length the ground will be easily reached by the extended fingers and even by the knuckles; rise steadily, and then (keeping the knees always straight) bend a little backward without any strain. Put out each hand with stretched arm horizontal with or a little higher than the shoulders; then raise the feet alternately, keeping the body steady, and touch the palm of the hand with the toe. Raise the leg and touch the shoulder with the bent knee. Raise the feet alternately sideways as high as possible, with the toe to the front, the legs not bent, and the body steady. Raise the foot, toe down and sole inward, and bring it with a sweep to the front, the sole then being downward, the toe pitched rather down, leg and knee extended and as high as possible (it ought to be horizontal), body erect and steady; the same, each leg alternately being extended laterally. One leg being extended to the front, slowly bend the knee and ankle of the other leg, the body and head being erect; on getting within a few inches of the ground, rise steadily, the leg always extended; then repeat this, alternating the legs. This may be practised at first with both arms extended to the front as a balance to prevent falling backward; but after a time it must be executed with the hands clasping the waist, the body being steady and erect throughout. Dumb-bells more or less heavy and clubs are used, to be raised, to be held out, or to swing round in various ways. The feet being together and the arms folded, sit down and rise without removing the feet or unfolding the arms; lie down with the arms folded and rise without unfolding them, &c. The balance step as taught the soldiers, and the facings, are also excellent assistants in procuring steadiness and equilibrium. 2. The horizontal pole (about 2½ or 2¾ inches in diameter and 7 to 8 feet in length) is in itself a little gymnasium. The pole being but just within reach of the fingers, stand under it and clasp it with the fingers of both hands, one hand on either side of the pole, and slowly raise the body till the right shoulder touches the pole; then lower the body till the arms are straight, when it should be raised again so that the left shoulder touches the pole; repeat several times, the legs being straight, with no jerk of the body, no bending of the knees, or other contortion throughout the entire operation. Having raised the body as above, let go

with one hand and keep the body up with the other. Stand facing the pole, catch it with both hands from the opposite sides (underhanded), and draw up the body till the chin is above the pole, without however touching it; then lower and raise the body as many times as can be done steadily without a jerk of the legs. Catch the pole from the near side (overhanded), and perform the same motions; this is more difficult than the last one. Catch the pole first in the manner first described, and walk along the pole from end to end and back with the hands, keeping the shoulder to the pole, body steady, and no jerking of legs. Do the same underhanded, keeping the chin above the pole, and then overhanded, which is the most difficult; mind that the chin do not touch the pole, and that there be no jerking of the body or legs. Raise the body as above described underhanded, then steadily raise the legs perpendicularly, the head being straight down; then throw the legs over the pole, the body and head rising as the legs descend on the opposite side, without jerking; repeat the same 2 or 3 times without touching the ground. Raise the body, the hands rather more apart and underhanded, and pass the legs through the space between the arms; lower the legs straight down, and then draw them back again; then raise them over the pole, descending on the other side. Raise the body thus and mount the pole; or the pole can be mounted by throwing one leg over it and swinging up, with or without the aid of the left arm near the shoulder. Being astride on the pole, rest on the hands in front, arms straight, and walk along with the hands, the body steady and the legs clear of the pole; then, without touching with the legs, return, walking backward. Hang by the feet, or by a knee bent, &c. Sitting, both legs on the same side, descend by a sort of somerset backward, holding the pole by the hands. A variety of exercises more or less similar to the above can be practised on this pole. Nearly all the above can be exercised on the pole suspended by a cord branching to both ends like a triangle; this pole can, if high, be mounted by throwing over it a rope by which to climb up. 3. The posts of the horizontal pole can be made to hold a light leaping bar, or cane easy to be knocked down, which can be made higher or lower at pleasure; a cord fastened is not suitable, being liable to cause persons to fall. The desideratum in jumping is to double the legs well under the body, bending the hip and knee joints to clear the object. There are several ways of jumping, as width or height; clear, or touching with the foot (called "on and off"); with the legs together or separate; vaulting; with or without a spring board; and with a leaping pole. 4. The parallel bars, about 2 feet apart and 8 to 4 from the ground, on which a variety of evolutions can be performed. Having a hand on each bar, raise the body, the knees bent and feet up behind so as not to touch the ground; depress and raise the body; then with a swing

throw one leg on each side before the hands, then behind the hands and on the bars, then both legs on the same side, then on the other side, before, behind, &c.; jump by jump with the hands, one on each bar, go the length of the bars (20 or more feet); roll along somerset fashion on the extended arms. 5. Ladders, nearly perpendicular, are with the hands mounted and descended by the bars, the legs hanging straight and steady and not subject to jerks or contortions; mount bar by bar; then pass the hand over one bar to the next, but in doing this raise the body with the two hands before losing the hand to catch the higher bar; then jump from bar to bar with the two hands together, legs steady; descend each time in the same manner that the ladder was mounted. The horizontal ladder is traversed in much the same way with a long stretch of arm. The ladder is also mounted and descended, the feet being beyond the sides. The mounting with great speed a high ladder in the usual way and descending another on the opposite side, is good practice, but requires a very large and lofty gymnasium. 6. Suspended ropes with hand rings are good. With one hand in each ring, raise the body and bring it to a horizontal position, looking downward; then lower the body, always horizontal, forcing back the shoulders. Raise the feet perpendicular, head down, &c. 7. The parallel upright poles. Climb up one, or both at the same time; or holding one in each hand, dash forward the body, forcing back the shoulders. 8. Pulleys having weights to be raised with cords. When the back is turned to the pulley, especially when the hand is elevated for the effort, the exercise tends to expand the chest; but if the pulley be in front, the shoulder is drawn rather forward, and the action should immediately afterward be reversed. 9. Ropes suspended, single or in pairs, smooth or knotted, afford practice for climbing; also to raise the body in various ways by alternate hands, or both jumping together, the legs always hanging down steady and together. The slanting rope is also used. 10. The swing or slack rope without a seat is good exercise for the legs and hips, the action being made solely by the person swinging; chains are dangerous, as being liable to rust and break. 11. The inclined plane is, when nearly upright, used for climbing with hands and feet; when more sloped, to run up and jump. The habit of jumping or dropping from a height may be very useful, always coming to the ground with springs in the feet, in the ankles, and in the knees, so as to break the force of the concussion; the balance should be such as to fall (if a fall must happen) forward on the extended hands, rather than backward. 12. A wooden horse is used for vaulting and jumping with or without a spring board, the leap bringing the person into the saddle from the side, or from behind, or over the horse in a variety of modes. 13. The kicking high with a run. 14. Holding out the body horizontally from rings. 15. Running along

beams, gradually narrower and higher according to proficiency, is an exercise very good and even necessary for persons of certain occupations, such as firemen, builders, soldiers, &c. 16. Giant's steps stretch the legs well. 17. Somersets require caution in the instructor, who turns the learner over his extended arm and catches or sustains him with the other lest he fall; they are, however, of little practical utility. 18. The lifting of very heavy weights, the purchase coming chiefly on the spine, and the bearing of weights on the body extended without support in the centre, are very dangerous practices, and should not be permitted in gymnasia. The lifting of weights from the arm alone is good, and can do no injury if the hand be not so placed before the body as to contract the chest; carry the weight to the side or upward with extended arm. All exercise with dumb-bells or clubs which might tend to bring the shoulders forward must be avoided. Beginners should never persist in an exercise after being too fatigued to do it well; the pupil should rather resort to some other exercise, and so relieve the muscles wearied, and call into activity others which have been less taxed.—Horsemanship, fencing, swimming, rowing, foot racing, boxing, wrestling, *la savate*, tumbling, circus riding, tight rope and ballet dancing, are species of gymnastics, though not classed under that description taught in the modern gymnasia. There are (especially in France) military gymnastics suited for soldiers in actual war, such as scaling walls by leaping on each other's shoulders in a pyramid; the use of the feet by kicking while fencing with the bayonet, &c.; the Zouave is a specimen of the military gymnast. The French *pompieri* or firemen have excellent gymnastic schools, which the men belonging to that department are obliged to attend daily, as a part of their ordinary duty. Sailors have, in climbing the ropes, masts, and yards, a certain description of natural gymnastic exercise.—Ancient gymnastics are treated in a few works: Plato, "Politics," book iii.; "Laws," book viii.; Galen, "On Preserving Health;" Hieronymus Mercurialis, *De Arte Gymnastica*, book vi. (Venice, 1587). On modern gymnastics there exist a variety of treatises. Many German physicians are now laboring to raise gymnastics to the importance of a medical science, especially Dr. Schreiber of Leipzig; see his *Kinesiatrik* (Leipzig, 1852), and his *Arztliche Zimmerymnastik* (1855, 5th ed. 1858). In Sweden, through the exertions of Prof. Ling (who has written largely on the subject), a thorough system of gymnastics has been introduced into the national schools, and is practised also as a branch of medical treatment.

GYMNOSOPHISTS (Gr. *γυμνος*, naked, and *σοφιστής*, a philosopher), a sect of ancient Indian philosophers, so called by the Greeks because they went naked, or almost naked. They dwelt in the woods, and lived on the wild products of the earth. They were remarkable for their contempt of death, and practised suicide

by burning. In this way Calanus sacrificed himself at Babylon, in the presence of Alexander the Great, and Xarimarus at Athens, in that of Augustus. The gymnosophists had a great reputation for wisdom and learning. Their most prominent tenet was the doctrine of the immortality and transmigration of the soul.

GYMNOTUS. See EEL, ELECTRICAL.

GYNÆCEUM (Gr. *γυνή*, a woman, and *οικον*, a dwelling), that apartment in the dwelling of the ancient Greeks where the women employed themselves in spinning, weaving, and other industrial works. At Rome, under the emperors, there was an extensive gynæceum attached to the palace, in which women manufactured cloths and furniture for the imperial household.

GYÖNGYÖS, a town of Hungary, co. of Heves, 44 m. N. E. of Pesh; pop. 10,000. It is situated at the foot of the Mátra range, contains a fine castle in which is an interesting collection of armor, 4 Catholic churches, a Franciscan monastery, town house, and gymnasium. It has also extensive manufactories of woollen stuffs, several tanneries and mills, an active trade in cattle and cheese, a weekly market, and numerous well frequented fairs.

GYPSIES, *Gipsies*, or *Gipsys* (a corruption of the word Egyptians), a vagabond people now found in most parts of Europe, and also in some other portions of the world. They call themselves Roma (men, Coptic *rem*), Sinte (probably from the Sind or Indus river), and Pharaons, in allusion to their pretended Egyptian origin. The names given to them by other nations are: Zingari in Italy, Gitanos in Spain, Zigeuner in Germany, Ozigányok in Hungary, Tsigani in Slavic countries, Tshengenger in Turkey, Sisech Hindu (black Indians) in Persia, Bohémiens in France (having arrived thither from Bohemia); also nicknamed Mattois, Gueux, Cagoux, and their language Blesquin in France; Zieh-Gauner (wandering rogues) in Germany, Heathens in Holland, Tartars in Sweden, &c. As they are ignorant of their origin, and as history has failed to record their migrations, there are very many opinions on the subject. Hasse and Schirak (1803 and 1805) attempted to connect them with the *Σκυρμας* of Herodotus (v. 9), north of the lower Ister (Danube), reported to be of Median origin. Büttner suggested, and J. C. C. Rüdiger (1782), Bacmeister, and Pallas affirmed, and Grellmann proved, their origin from India, whence they were driven by the ravages of Tamerlane (1398), and where they belonged to the Soodra caste, or rather Pariahs. Vulcanius (1597), Frisch, and Wagenseil assert that they are but robbers; so also Laurs Hervas (1787), who considers their language as a mere *gerigonza* (jargon) of banditti. Hiob Ludolf (*Commentarius ad Historiam Æthiopicam*, 1691) gave a list of words supposed to be Egyptian, but which are rather Slavic. There are many roving tribes in India which resemble the gypsies; for instance, the Thuba-raja and Chandala outcasts, the Panchpiri and Basigurs or

Nuts, observed by D. Richardson, and others by Bishop Heber; the Tchingani, robbers near the mouths of the Indus, where our Zingari may have been gold-washers, according to Karl Ritter. Some connect them with Strabo's Siginni in the Caucasus, others with the Uzbeks. Pauli v. Bartholomeo (1796) and Alter derive them from Guzerat, Pallas from Mookan. Organized gypsy bands first appeared about 1417 in Germany. They numbered about 14,000 in Italy as early as 1422. On April 14, 1427, arrived at Paris from Bohemia (they said a band of 120 strangers, claiming to be Christians of lower Egypt who had been expelled by the Saracens. They said they had confessed to his holiness Martin V., who, as a penance for sins committed on the way, had ordered them to traverse the world for 7 years without sleeping in beds. They had among them a duke, a count, 10 lords, and a number of women. The women wore gold ear rings, and had black curly hair. They professed the gifts of fortune-telling and palmistry, and were great thieves. The authorities would not permit them within the city of Paris, but assigned them La Chapelle near St. Denis for a residence, where they were consulted on occult matters by great numbers of the citizens. Finally, the bishop of Paris had them removed, and excommunicated those who had consulted them. Their credentials were doubtless spurious. Notwithstanding their removal from Paris, they continued to wander in France, and other bands succeeded them. From France they crossed into England. Wherever they came they practised the arts of thieving and deception, until they became a nuisance in all the states of Europe. Severe laws were passed against them, but these measures, not being simultaneous in the various states, failed of their effect. Francis I. ordered them to leave France on pain of being sent to the galleys without trial whenever caught; and later, in 1560, the states-general of Orleans condemned them to perpetual banishment. Pope Pius II. (died 1464) cites them as thieves who preyed through all Europe under the name of Zingari, from the country of Zochori in the Caucasus. Spain exiled them in 1492, and a century later renewed the decree of banishment. In England, Henry VIII. in 1580 issued a proclamation against them, which was renewed by Elizabeth. Sir Matthew Hale mentions 18 being caught and hanged at the Suffolk assizes for not having obeyed the order to "void the realm" within 80 days. The Scottish kings pursued a different policy, and seem to have extended to them a sort of protection. Writs are extant by Mary, queen of Scots (1558), and by James VI. (1594), directing the sheriffs of counties to aid John Faw, lord and earl of Little Egypt, to keep his subjects in subjection, he having promised to remove them back to their own country. Italy, Denmark, Sweden, the Low Countries, and Germany took measures against them. In the first half of the 16th century they probably received an accession of numbers from Egypt, for history

informs us that in 1517 a revolt against the conquest of Sultan Selim took place under one Zinganeus, whose followers, being banished, took to wandering throughout the world in small companies. From Zinganeus some have derived the name Zingari without reason, for Pius IV. in 1464 used the appellation. The sovereigns of Germany made efforts to reclaim and settle the gypsies. Maria Theresa in 1768 ordered that the numerous bands throughout her dominions should be gathered in settled habitations, practise some trade, have their children educated, and be called *Neubauern*, new peasants. As they failed to obey, severer measures were enforced by Joseph II. in 1782, and not without effect, for at the present day the gypsies of Transylvania, Wallachia, Moldavia, and Hungary, where they number 200,000, have more nearly approached to a settled life than their brethren anywhere else. In Transylvania they are under the rule of a waiwode of their own race, elected by themselves. They are likewise numerous in the southern provinces of Russia and in Turkey. Spain contains about 40,000, mostly in the south, where, too, they occasionally follow a fixed occupation, as keepers of wine shops and horse dealers. A considerable number are in Norway; in France there are few or none; and in England, since the establishment of county police and the enclosure of waste lands, their numbers have decreased from 18,000 to less than 9,000. In 1830 the total number in Europe was estimated at 700,000. The laws against them have in most countries fallen into desuetude, they having to contend with a stronger force than legal prohibitions in the increase of intelligence among the rural population, who were formerly their patrons and victims. The gypsy physiognomy is Asiatic in type, with tawny complexion, quick black eyes, black hair, high cheek bones, slightly projecting lower jaw, narrow mouth with fine white teeth, which, with their lithe and agile figure, causes some of their young women to be considered beauties. Their habits are, however, so squalid and depraved as to cause them before they are past middle age to fall into decrepitude. The gypsies have few redeeming characteristics. They are treacherous, cowardly, revengeful, and cruel. They have little or no religious belief, and no words in their language to signify God, the soul, or immortality. Velasquez says: "The gypsies' church was built of lard, and the dogs ate it." Marriage is a temporary form with them, and the limits of consanguinity are not respected. They pretend that their skill in palmistry is the lore of the Egyptians. Their ultimatum of industry reaches no higher than the tinkering of hardware, and turning small articles in wood, with occasionally some assistance reluctantly given in farm labor. In Transylvania they do a little in washing gold. They frequently act as musicians, inasmuch as they have a remarkable quickness in acquiring tunes by ear. Some of them, as Kecskeméti, Kálozdy, Bunkó, &c., are among the most cele-

brated violinists of Hungary. The young persons of both sexes are fond of dancing, and exhibit their skill for money, especially in Spain. The men wear no distinguishing dress from other similar vagabonds, but the women indulge their passion for gay colors and trinkets. In England the recognized gypsy woman's apparel is a red cloak with a hood, and a handkerchief tied over the head. Their huts are mere kennels of earth and boughs. It is questionable whether a band of genuine gypsies has ever been in America. —GYPSY LANGUAGE. The Sinte or gypsy language has no letters of its own, but its phonetism is harmonious, like that of the Sanscrit. Most words end in *o* (which is often masculine), *i* (often feminine), *e* (often plural), and *a*. The nouns are declined in 9 cases, terminating thus: singular nominative, *o*, *i*, *a*, or in consonants; genitive, *eskero*, *iskero*; dative, *eske*, *usti*, inanimate things *ette*, *etti*; accusative, *ea*, *us*, inanimate things like the nominative; vocative, *ea*; ablative, *estar*, *ester*, *uster*; instrumental, *eha*, *aha*; sociative, *ha*, *ssa*; locative like sociative, for inanimate objects *e*; plur. nom. *e*; gen. *engero*; dat. *enge*, *ende*; acc. *en*; voc. *ale*; abl. *ender*, *endar*; instrum. *essa*, *enssa*. Examples: *tsiriklo*, bird; *manush*, man; *peen*, sister; *bar*, stone; *tsirikleskero*, of bird; *manushusti*, to man; *peen-yater*, from sister; *barengero*, of stones, &c. There are some anomalies in form, for the sake of euphony. Compound nouns are not numerous. The article is borrowed sometimes from other languages, as are many other words. This circumstance produces a sort of dialects in the language; the following words altered from Slavic may suffice as examples: *litehos*, face; *paros*, vapor; *dembos*, oak; *doko*, spirit; *zelyuno*, green; *dsirka*, hole, &c. Adjectives are distinguished by gender, thus: masc. *grubo* (Slav. *gruby*, Germ. *groß*), fem. *grubi*. The genitive *o* becomes feminine *i*, thus: *geyeskero rakle*, disciple of man; but *geyeskeri dei*, mother of man. The genitive also furnishes adjectives: *bershiskero*, annual, from *bersh*, year; *kashtero*, wooden, &c. The pronouns are: *ma*, I; *tu*, thou; *lo* (*yo*), he; *li*, she; *mea*, we; *tume*, you; *le*, they; genitive, *miro*, of me; *tiro*, of thee; *leskero*, of him; *laskero*, of her; *meero*, of us; *tumaro*, of you; *leenero*, of them; dative, *mange*, to me; *tuke* (*putte*), to thee, &c.; *meende*, to us; *tumende*, to you, &c.; accusative, *man*, me; *tut*, thee; *lea*, him; *la*, her; *meenge*, us, &c.; ablative, *mander*, from me; *tuter*, from thee, &c. The genitive when used as a possessive (my and mine, &c.) changes the *o* into *i* for the feminine. The relatives are *ka*, *kön*, for inanimate objects *ko*, *so*, &c. Comparative degree, *idir*; superlative formed by prefixing *kön* to the comparative, thus: *kamlo*, dear, cherished; *kamlidir*, dearer; *kön kamlidir*, dearest (who dearer?). The numerals are: 1, *yek*; 2, *dui*; 3, *trin*; 4, *shtär*; 5, *pantsh*; 6, *shöb*; 7, *efta*; 8, *ochdo*; 9, *ennia*; 10, *deah*; 20, *bish*, &c.; 100, *shët*. Ordinals are formed by suffixing *to*, as *yekto*, *duito*, *tritö*, &c. The conjugation of verbs is modified somewhat according to their ending either in vowels or in

consonants. The imperative is the theme, as: *cha*, eat; *kamma*, love; *da*, give; *la*, take, &c. The infinitive is formed by prefixing *te* and by suffixing *af*, thus: *te kammaf*, to love; *te daf*, to give; *te kiraf*, to make, &c. The personal pronoun may be put before the verb in the finite moods, or it may be omitted, as in Latin. There are 8 single tenses in the indicative, of which the present is fullest; thus: *kamma-va*, am-o; *kumma-ha*, ama-s; *kamma-la*, ama-t; *kamma-ha*, ama-mus; *kamma-na*, ama-tis and ama-nt. The imperfect ends in *ea*, and distinguishes the persons by pronouns: *kamma-ves me*, ama-bam, &c. The preterite ends in *iyum*, *uyum*. But the future is expressed either by the present, or periphrastically by means of the auxiliary *kamma*, will; thus: *me dava*, or *me kammava te daf*, I will to give—I shall give. The passive is formed by means of *te hiaf*, to be; *te avaf*, to come; thus: *me vava kurdo* (fem. *kurdi*), I am beaten; *mes odha kurda*, we are beaten. The substantive verb is conjugated as follows: *hom*, sum; *han*, es; *hi*, est; *ham*, sumus; *han*, estis; *hi*, sunt; past, *hommee*, *hannes*, *haes*; plural, *hammee*, *hannes*, *haes*. To have is expressed by to be with the dative (as in Latin): *hi meende*, est nobis. Ability is denoted by the invariable word *fasti* (Latin *fas*), obligation by *homte* or *hom*; thus: *me fasti ligervava*, I can carry; *me homte dahav*, I must go (*mih est eundum*). Relations between words and sentences are expressed by particles. We subjoin a specimen of gypsy phraseology, compared with Latin:

*Maro dad, kōm tu han andro bollepast, te ven (vel)*  
 Noster pater, qui tu es in caelo, ut veniat  
 tui patris tui lavasti, &c.  
 (article) honor tuo nomini.

In other dialects the same is expressed thus: *Maro dad, kolim andro tãheros* (colis), *ta veltro senta nav* (ut veniat tuum sanctum nomen); Spanish-Gitano: *Amaro dada, ote andre o tarpe, mayarificable sinele tun nao* (magnificetur tuum nomen), &c. Many words are Bengalee, Malabaree, Magyar, Turkish, Wal-lachian, Spanish, &c., according to the various residences of this peculiar people, whose whole literature consists in some rude poems.—For further information on the gypsies and their language the following works may be consulted: Valentge's "Description of the East Indies" (Amsterdam, 1724-'6); Peyssonel, *Sur les peuples barbares qui ont habité sur les bords du Danube* (1765); Pray, *Annales Regum Hungariae* (5 vols. fol., Vienna, 1764-'70); Grellmann, *Historische Versuche über die Zigeuner* (Göttingen, 2d ed., 1787); G. Molnár, *Specimen Linguae Cingaricae* (Debreczin, 1798); Gardiner, "Essays, Literary, Political," &c. (Edinburgh, 1803); W. F. Bischoff, *Deutsch-Zigeunerisches Wörterbuch* (Ilmenau, 1827); John Staples Harriot, in the "Transactions of the Asiatic Society" for 1831; Mich. de Kogalmichan, *Esquisse sur l'histoire, les mœurs et la langue des Cigains* (Berlin, 1837); Fr. Predari, *Origine e vicende dei Zingari* (Milan, 1841); George Borrow, "The Zincali, or an

Account of the Gypsies of Spain" (3 vols., London, 1841); Von Heister, *Ethnographie und geschichtliche Notizen über die Zigeuner* (Königsberg, 1842); P. Bataillard, *De l'apparition et de la dispersion des Bohémiens en Europe* (in the 5th vol. of the *Bibliothèque de l'école de Chartres*, 1844); Böhtlingk, *Die Sprache der Zigeuner in Russland* (St. Petersburg, 1852); and Thours, article *Zingares* in the *Encyclopédie moderne*.

GYPSUM (Gr. γυψος, Lat. *gypsum*; perhaps from Gr. γη, earth, and εψω, to concoct), a mineral substance, often an important member of rock formations, consisting of sulphuric acid, lime, and water, in the proportions given in the article ALABASTER, which is a pure granular variety of the rock. It is a hydrous sulphate of lime, its composition represented by the formula  $\text{CaO}, \text{SO}_3 + 2\text{H}_2\text{O}$ . It occurs among the tertiary strata of the London and Paris basins, and its abundance in the latter has given it the name of plaster of Paris, by which it is very generally known. In North America its most extensive beds are in the secondary rocks, especially the lower carboniferous of Nova Scotia and the devonian of New York and Virginia, associated with rock salt and saliferous marls and clays, and limestones. It is also met with in small quantities in tertiary and alluvial deposits, and occasionally in crystalline and metamorphic rocks. Iron pyrites and limestone produce it by mutual decomposition; and the extensive beds of the rock which are found among limestone formations have been sometimes referred to this cause for their origin; but if they had been thus produced there should be present corresponding accumulations of oxide of iron, which is not the case. It is formed wherever sulphuric acid is generated, so as to come in contact with carbonate of lime, as about the craters of volcanoes, around sulphur springs, &c. Sea water contains it in solution, and it is taken up by fresh water in the proportion of one part in 400 to 500 of water. The structure of gypsum is variable even in hand specimens; in the compact, fibrous, and foliated mass are seen imbedded broad crystals, transparent like mica, and cleaving like it into thin plates, which, however, easily divide by cross planes, referring the primitive form of the crystal to a right oblique prism. This crystallized gypsum is called selenite; the ancient Romans are said to have used it instead of glass, and it was known to Pliny for this use, as well as for plaster. Much of the gypsum of the Paris basin is of earthy texture, and contains, according to Beudant, 7.68 per cent. of carbonate of lime. This variety, found at Montmartre, is much preferred for the preparation of strong plaster used in buildings; but the lenticular crystals and compact varieties, as alabaster, of the same vicinity, make a finer plaster, and are preferred on this account by those who model small articles in this material. Varieties containing carbonate of lime are met with in the gypsum beds of western New York. Gypsum, especially the earthy quality, is often colored by the presence

of oxide of iron or other coloring matters, and is found of various shades of gray, brown, red, yellow, and is often black.—An anhydrous sulphate of lime is also described as a distinct mineral species under the name of anhydrite. It is of greater hardness and specific gravity than gypsum, and of another crystalline form. It occurs however with gypsum, and passes into it by absorption of water. At Bex in Switzerland it is stated that extensive beds are thus changed wholly or in part near the surface, but beyond the reach of atmospheric influences the rock is anhydrite. At Picton in Nova Scotia, and in southern Virginia, varieties of gypsum have been met with containing only half an equivalent of water, of the formula  $2(\text{CaO}, \text{SO}_3) + \text{HO}$ . Prof. W. R. Johnson detected the composition of the gypsum of the former locality, and its identity with that of the scale deposited upon the boilers of a steamer using sea water. Prof. Johnston of England also detected a deposit of crystals of gypsum of this composition in the boiler of an English steamer.—An important use of gypsum is for making plaster for casts and for stucco. The best qualities are first calcined till nearly all the water is expelled, and the stone is then reduced to powder. When water is added to form a paste, the mixture hardens in one or two minutes and sets, giving out some heat; but this property is not exhibited if the calcination was effected at a higher temperature than  $300^\circ \text{F}$ . The water taken up is just equal to that expelled. For stucco it is recommended to use about one third pulverized carbonate of lime with the calcined gypsum. The ancient Greeks were acquainted with this use of gypsum, as appears from the writings of Theophrastus and others. For ordinary purposes gypsum, first moderately dried, is reduced to powder by grinding in a mill, and is then calcined by a process called boiling, which is heating it in kettles until the water is driven out. As it passes up in the form of steam through the mass, it keeps the particles moving, as in ebullition. Much of the fine powder is carried up by the heated air, and is deposited upon the roof of the building and the trees and other objects around, appearing like snow. The process is completed when the motion of the powder in the kettle ceases. As calcined gypsum rapidly absorbs moisture from the air, and loses its value as a plaster, it is well to make it in small quantities only at a time, and keep it well protected in air-tight vessels. In Spain and France gypsum is used for a cement for floors and vaults; for this purpose it is made into a kind of mortar with sand and quicklime. In 1838 Prof. Emmet, then of the university of Virginia, discovered that powdered gypsum, without being calcined, would become solid when mixed with a solution of potash or of various salts of potash, effervescence taking place when the carbonate was employed, and this salt being partially converted into the sulphate. No effect was produced with the chlorate or nitrate of potash, nor with any salts of soda. Rochelle

salt, however, acted instantaneously. The chemical effect is produced probably by the formation of bibasic salts. The product, on being broken up and reduced to powder, may be treated again with the same results by adding more of the potash solution; and the process may be repeated several times, the alkali at last forming the principal ingredient of the mixture. If a lump of calcined gypsum be treated with a solution of borax, alum, or sulphate of potash, the quantity of the salt being one or two parts in 100 of gypsum, and the product be then again calcined and ground, the plaster, when mixed with water, will require several hours to set. The calcination may be effected at a red heat without lessening thereby the tendency of the plaster to set.—Gypsum is used to some extent in glazing porcelain. The principal consumption of it, however, is as a fertilizer to soils. Sulphate of lime is an ingredient in the composition of the grasses, potatoes, turnips, &c.; and these cannot flourish in soils entirely deficient in it. The grains do not require it. To the grasses it is best applied as a top dressing, being spread in a powdered state over the young shoots, always in wet weather. With the roots it is sown in the hills, or the seeds are rolled in the powder before planting. Peat ashes contain gypsum, and to this their beneficial effect as a manure is probably owing. Immense gypsum beds are found in the western counties of New York, S. of the Erie canal. They may be traced for miles over the surface of the country, and are sometimes 18 feet thick. Between Auburn and Syracuse from 40,000 to 50,000 tons were removed in the excavations for the railroad. Many quarries are worked, and the stone is ground in mills for the use of the farmers, and is also transported to distant localities for sale. The quarries of Nova Scotia furnish large quantities to the seaport towns of the United States.

**GYROGONITES** (Gr. *gyros*, curved, and *gonos*, seed), the seed vessels of fresh water plants of the genus *chara*, originally supposed to be microscopic shells. They occur in fresh water deposits, both recent and belonging to the tertiary formation. (See *CHARA*.)

**GYROSCOPE** (Gr. *gyros*, a circle, and *skopeo*, to examine), a means of exhibiting phenomena of rotation or gyration, the name being now applied to a variety of instruments devised for this purpose. By the so called first law of motion, a body once caused to move tends to advance at the speed given in a right line and for ever. The second law, found by Galileo, affirms that the effects of two or more forces made to act at once on the same body coexist within such body, so that it can obey no one of them singly, but must move in an intermediate or resultant line. In accordance with this law, a body or any number of particles, impelled forward, and held at the same time by cohesion to a centre or axis, must describe a circle about such centre or axis; if the latter, the movement is termed rotation. About the year 1760 Paolo



Frisi of Milan extended the second law above named to the case also of rotatory motions, by demonstrating this proposition: if a body have applied to it simultaneously two forces, capable, when acting separately, of imparting to it rotations about two different axes, it will obey neither of these directly and simply, but will in consequence of their combined action turn, or tend to turn, about a third axis lying between and in the plane of the two primary axes, and so inclined to these two that the sines of the angles made by it with them shall be inversely as the angular velocities about those axes respectively. It is easily seen that this principle, the composition of rotations, is but an application of that of the composition of motions to cases of turning bodies. Of the operation of this principle in the case of the diurnal revolution of the earth, the precession of the equinoxes is a direct result. Without arriving at the general law, D'Alembert had in 1747 solved this particular problem; though Euler, Poinsot, and Poisson, the last named about the beginning of the present century, severally aided in perfecting the demonstration; and Prof. Bohnenberger of Tübingen (1817) seems to have devised the first instrument for illustrating both the new law and precession; unless, perhaps, the instrument used by Laplace was different and prior, which is doubtful. Bohnenberger's machine, still common, has a disk or wheel, so suspended that all its movements are about its centre of gravity, turning on pivots within 8 rings whose attachments are successively at right angles with those of the next preceding, like the gimbals of a compass. A string is wound upon the axis, and, by being forcibly unwound, gives a rapid rotation to the disk. Thus turning, the disk strongly resists any force so applied as to tend to deflect its particles from the plane in which they are moving. It has a high degree of stiffness or fixedness in such plane, proportional to the sum of the momenta of all the moving particles—an effect designated as the fixity or persistence of the plane of rotation. This effect becomes very sensible to any one who endeavors to twist into a new plane any rapidly turning body; and it is seen also in the tendency of a trundled hoop to maintain itself upright, and in the directness of flight of rotated projectiles. This, again, is an extension of the first law of motion to rotating masses. But the resistance thus shown to deflection is mainly apparent; the deflecting force is usually very slight compared with that already present in the turning mass. Made sufficiently great to occasion obvious effects, such force is in reality acting to produce a second and independent rotation about some other axis; the result is a tendency of every particle of the mass to turn about a third axis; and as the pivots constrain the mass, determining its axis always in the line between them, the effect becomes a tendency to place this actual axis in the position of the third or resultant axis. That is, the rotating body never simply obeys a pressure oblique to its existing plane of motion, but

moves into some new position, in an apparently anomalous way, yet one which is really explicable by Frisi's law. When the deflecting impulse is continued, the effect is constantly repeated, and the plane of motion is continually twisted in such a way that the poles of the axis, at right angles with this plane, are made to describe a circular movement, or, if the deflecting impulse be intermittent, to trace epicycloidal curves. To this continuous twisting of the plane of actual rotation, due to the composition of two independent rotations, the name of precessional motion has been aptly applied. The case last described is exactly that of the earth. So long as the plane of the equator is oblique to the planes in which the sun, moon, and other heavenly bodies move, these bodies must act upon the protuberant mass of the earth's equatorial region, tending, with various degrees of force, to pull the equator down into such planes. As often as the sun or moon, the effect of which bodies in this respect is greatest, is in the plane of the equator, its action becomes null. Thus the effect of the sun is continually varying between a maximum at the solstices and 0 at the equinoxes. Considering the action of this body only, we find a force intermittently applied to produce a new rotation of the earth, other than that round its actual axis. Hence, the earth's axis does not remain parallel with itself, but gyrates slowly like that of an inclined spinning top; as a consequence of which the intersection of its equator with the ecliptic falls back yearly about 48" of a degree, and the equinoxes are anticipated in the same proportion; and again, owing to the intermittency of the action, the terrestrial poles nod or describe less curves along their circular path among the stars, which requires about 25,868 years for its completion. (See PRECESSION, and NUTATION.) Precession is closely imitated by slightly loading one side of the inner ring of the machine above described. But in the nicest apparatus there are disturbing influences, especially friction, that usually prevent perfect conformity with the theory. This can be found only in the case of the astronomical bodies, which turn in free space; but the earth's actual axis being a principal axis of its form, and the shortest, this body must refuse to shift the direction of its axis within itself, and, like the confined disk, can only strive continually to place the actual in the line of the resultant axis, the latter of which, as long as the second impulsion is acting, continually advances before it.—Atkinson and Elliot, in England, and a little previously (1881) Prof. W. R. Johnson of Philadelphia, each unaware of what the other was doing, invented modifications of the machine now described; the latter, it is believed, first discovered the peculiar form in which a heavy disk seems to lose its weight and to refuse to fall, although apparently unsupported; this was termed by him the rotascope, and is now somewhat widely known as the mechanical paradox. In 1851 Fessel of Cologne seems independently to have invented a like instrument;

in 1854 Magnus brought out various forms of it under the name of polytropium. Foucault employed a simple modification of the original machine in his noted experiments about the year 1858. He had previously claimed to have produced a visible demonstration of the earth's axial rotation, by means of a pendulum with a long, fine wire, and made to oscillate within a graduated circle. Supported at a point, such a pendulum is independent of the earth's diurnal motion, and by its inertia tends to swing continuously in the same absolute direction in space, or in planes constantly parallel. But at any point not on the equator, the meridian of the place will continually turn away obliquely from the absolute direction it has at a given moment. Hence, the plane of oscillation will seem to an observer to be actually and steadily turning away in the opposite direction—in the northern hemisphere, the course being that of the hands of a watch. Over either pole, no disturbance being supposed to arise from the air, rigidity, and friction, a complete apparent revolution would occur in just 24 hours; the time required would increase as the place of experiment approached the equator, varying with the sine of the latitude; on the equator, no revolution would occur. These conclusions have been sufficiently verified by Foucault with a pendulum suspended within the cupola of the Pantheon at Paris, and by other observers. The want of entire conformity of the results with the theory, however, having occasioned the expression of doubts on this point, the gyroscope was next employed. A carefully constructed disk was suspended with the utmost delicacy, its outermost pivots and its plane being vertical, and its motions almost wholly free from friction. The disk being made to rotate with extreme velocity, by machinery at once disconnected, and its plane being brought into that of the meridian and earth's axis, it should maintain this plane, and act precisely as the pendulum; experiment verified the conclusion. Surrounded by a graduated horizontal circle moving with it, and viewed through a telescope which, being fixed in the meridian of the plane, must deviate with the latter if the earth were a fixed body, the same aspect of the disk and point on the scale should continually present themselves through the telescope; but in fact the circle and disk were seen to revolve steadily before the telescope, an appearance due to the actual deviation of the latter. This experiment, in the conception but not in the execution of which Foucault was anticipated by 20 years by Mr. Sang, depends for its success on the accuracy of the adjustment; a slight obliquity from the vertical, or a want of correct centering of the disk, being sufficient to compound the earth's rotation with that of the disk, and give an active precessional motion in place of the mere fixity of the plane of rotation on which the demonstration hangs. Remembering that the causes of motion act with reference to absolute, not to relative space, that the meridian continually shifts its plane, and

that the phenomena of the properly balanced disk agree very closely with what would hence be expected, it is safe to say, with Whewell, that, provided the doctrines of mechanics be valid, "the experiments of Foucault prove the diurnal motion of the earth in the most conclusive manner;" and in this result we find no less an authority than Sir J. Herschel in the recent edition of his "Outlines of Astronomy" coinciding. Until Bradley discovered the aberration of light, the motions of our planet were inferences only. That phenomenon afforded physical proof of the annual, and in a less marked degree also of the diurnal motion. And now, we are enabled to sum up, beside those arising from centrifugal action, 6 other distinct physical proofs of the diurnal revolution, of which the discoveries and reflections of the last 6 years have put us in possession, namely: 1, the pendulum experiment; 2, the gyroscope; 3, cyclones, or rotatory storms and ascending bodies of air; 4, the rotation of liquids escaping downward through an orifice; 5, the oblique course of the great aerial and ocean currents; 6, the deviation from the meridian of the path of projectiles, fired northerly or southerly, especially those that rotate. In all these, the results are, as they should be, opposite in the two hemispheres; in the northern the first two giving the direct or watch-hand movement; the second two, for reasons that will become apparent on studying the phenomena, giving the opposite or retrograde rotation; and the third two agreeing in always showing deviation toward the right hand.—The ever-recurring test question of the popular mind, *Cui bono?* has persistently pursued the gyroscope. This can now be answered: 1, it illustrates precession, and proves its cause; 2, it explains the top and the boomerang, as well as other curious movements; 3, it renders the daily revolution of the earth a visible fact; 4, restricted to one plane, it is theoretically, though not yet practically, a polar needle, readily showing the cardinal points of the compass, and by the line of its axis indicating latitude. But, 5, its most admirable application to practice is that worked out by Prof. O. Piazza Smyth, in 1855. Hitherto, observations on shipboard requiring the telescope, as those of the eclipses of Jupiter's satellites by which longitudes are determined, have been rendered impracticable or almost valueless during a heavy sea, from the want of any certain means of securing a support unaffected by pitching, rolling, and lateral deviations of the ship. The suspended stand or rest proved unavailing, since any motion given to the point of suspension caused the apparatus to oscillate, like a pendulum. The apparatus of Smyth consists of a horizontal platform bearing the telescope, and if needs be the observer; the whole upheld upon a rim within which revolves a large, heavy wheel, supported in gimbals in such a way that the common centre of gravity of the whole shall be at the invariable point forming the centre of the wheel. When to be used, an immense rotatory velocity is by a brief connection with

the ship's engine imparted to the wheel. The plane becomes fixed for the time, the ship really oscillating about it, and thus pitching and rolling are corrected. The lateral deviation, of less moment, may be corrected by the incorporation into the system of a second wheel rotating vertically. This invention, successfully tested on board the yacht *Titania* during the astronomer's visit in 1856 to Teneriffe, seems to have supplied a grand desideratum in practical navigation.—The most curious and generally interesting form of gyroscope, rightly named "mechanical paradox," although its principle was discovered long before its first construction, consists essentially of a disk revolving on pivots within a ring, having on the line of prolongation of its axis, on one side, a bar or spur with a smooth notch beneath to receive the hard smooth point of an upright support. Thus placed, when the disk is not turning, the whole falls, of course, like any heavy body unsupported. Rotate rapidly by unwinding a string, set on the support, but uphold the opposite side of the ring; no peculiar movement then occurs. But if while the disk is rapidly turning, the bar being on the support, the opposite side be set free, the whole, instead of falling, as would be expected, commences a steady revolution in a horizontal circuit about the point of support, moving more rapidly as the primary rotation is expended, and sinking, at first imperceptibly, then more rapidly, until in from one to three minutes it comes down to rest. Many explanations have been offered of the phenomena of this instrument, by those who did and by those who did not understand the principle of the composition of rotations; but each of these, so far as it is true, can be shown to be obviously only some particular form of expression of that principle, while many of the explanations thus offered are highly mathematical and abstruse. The following explanation, proposed by Dr. Levi Reuben of New York, although in accordance with the above principle, is not so obviously a restatement of it, and has the merit, it is believed, not only of including all the facts, but of being intelligible to those who clearly understand even the simple laws of mechanics. A few other facts may be preliminarily stated. The disk started with its axis in or below the horizontal never rises, without aid, above its first position. Started with high speed above the horizontal, it may rise, and if its connection with the support allow, as when this is by a ball and socket, it may even ascend to a vertical position, and spin as a top. Arrested in its travelling movement, it always descends; hastened, it rises. Checked in any part, it inclines in the direction of that part. In the form now given, the travelling or orbital movement is always in the direction in which the bottom of the disk is going. But if the spur be prolonged beyond the support, and the disk and ring slightly overpoised by a weight on the other side, then the disk always travels in the direction in which its top is going, and nearly all the phenomena are

reversed. Many other curious results may be obtained; it will here be added further only that the disk below the horizontal is always, and above it usually, slowly falling; and that the orbital motion invariably takes place toward that side of the disk in which the force of the rotation about its own axis is most resisted or checked. For proof of this latter principle, let any small wheel be rotated, and while turning rub or seize it upon any side; the rotation in this side being thus checked, and actually or in effect subtracted from, that in the opposite side preponderates, and the wheel is urged toward the side in which the checking occurs. There are two facts to be explained—support, and orbital movement, or travelling about the supporting point. For the first, suppose the disk composed of 1,000 equally heavy particles. When it is set rotating and released, each of these particles is, as a separate ball, acted on by two moving forces, that giving the rotation, and that of gravity; but the whole is also held together by the constraining action of cohesion. Suppose that, when released, the axis points below the horizontal: gravity acts in vertical lines and equally on all the particles. Its direction and amount may be represented by equal short pendent threads dropping down from all the particles. Being necessarily equal, the lower extremities of these threads will all fall equally far without or in front of the place of the particles; and if the latter be also supposed in a single plane, the extremities will really form a new plane, slightly without and below the place of the disk, and parallel with it. But one force never in reality interferes with the action of another; both have independently their full effect. The forces impressed in giving rotation upon the several particles of the disk will all point in its plane, being represented at any moment by tangents to the circles in which the several particles move, pointing forward in all directions, and varying in length from the axis, where this is zero, to the periphery, where it is a maximum. But the resultant movements or tendencies of the particles must all terminate in the exact plane in which the gravitative components were seen to terminate. Every particle thus acted upon, then, tends to go outward or forward into the new plane already referred to. The several pressures are to points scattered somewhat widely in that plane; but owing to the cohesion of all the particles, they are constrained to move or press forward in a body. The effect is as if the whole disk were pulled outward and very slightly downward, while the pivot in the notch reacts or pulls in the opposite direction; and the wheel is supported, in part, as if slung up by strings attached to its two faces and pulled in opposite directions. When the disk is above the horizontal, the new plane is behind or within it; it then pushes against the pivot, and this reacting, there occurs support by opposite pressures, instead of tractions. Thus we discover one reason why no material support is needed for the remote

end of the axis; while as a consequence of this view, if the axis be horizontal it must first sink slightly, yet it may be only imperceptibly, before support can occur. In the second place, why does the disk travel around the supporting point? When not overpoised, gravitation acting downward, and rotation, in the ascending side of the disk, upward, the latter is in effect decomposed into a horizontal and a vertical component, the horizontal expressing itself in the pressure already referred to, the vertical being resisted or antagonized by the force of gravity; the result for each particle being the sum which the latter as a negative quantity would form with the former. In the ascending side, therefore, gravity overbalances, equals, or diminishes, according to the place of each particle, the rotative force of ascent acting upon it; but to the vertical component of the rotative force of all the particles in the descending side it adds alike a quantity of action equal to its own amount. Hence, the whole rotative force in the descending half may be considered as increased, that in the ascending as diminished. There will be some point in the ascending half at which the vertical component of rotation equals gravity; this will become in effect a point of rest, or of no action. This is then the point pierced by the resultant axis—the point about which all the particles under the combined forces will tend to revolve: those in the ascending half starting with less radii to sweep round this point as a centre; those in the descending starting with longer radii, and sweeping in longer curves about the same point. Thus the disk is continually carried to the side in which the action is most checked; and this constitutes the travelling movement. When overpoised on the opposite side, the action of gravity on the disk itself is upward; the rotative force of the descending particles is now resisted by it; and for a like reason the disk now moves toward its descending side. When not over-poised, the travelling movement of the disk itself introduces a new element into the case, by resisting the rotating of particles in the upper half backward in the course of movement. This checks and diminishes the action in the upper half of the disk, and constitutes a new source of support by generating a tendency upward; and it is doubtless this part of the action that raises the disk at times to an erect position. The principles thus arrived at explain also why the disk travels faster as its axial rotation lessens, and also when weights are added to it; why in the ordinary form it rises if hastened with the hand; why, if overpoised, it descends by being hastened, and rises on being delayed in its orbital movement; and in fact, it may safely be said, every phenomenon which the instrument can be made to present. The same explanation, in effect, applies if the rotating body be a sphere, or of any other form. The facts of support and orbital movement, though separately considered, are really but two different expressions of the

same phenomenon; the two actions, here for convenience separated, really conspire in one movement, and that is the composition of a rotation caused by gravity with another imparted by the hand. The reason why the rotating body does not fall is, that in such a body, whenever its plane is oblique to the vertical, gravity is no longer allowed to act singly, but must in every instant enter into composition with another force. Hence the body in such case cannot simply fall, but must move toward such new place in space as the combined actions shall determine; and hence, again, the same force which ordinarily produces a vertical fall, here carries a body round in a horizontal circle, or secondarily sometimes even causes it to ascend. And thus it is seen that although gravitation is a universal fact, weight is not so, but can only show itself to the extent to which the former is allowed to act uncombined. The weight of the rotating disk, however, is by reaction expressed through the support and base on which the apparatus rests. In this explanation, the distance through which the gravitative force acts has been taken as very short, because by experiment and calculation it can be proved that, unless the weight of the ring is very great, the whole downward action of gravity on the disk is very slight compared with that of the rotation first imparted by the hand, sometimes as small as in the ratio of 1 to 40 or 60.

GYROWETZ, ADALBERT, a Bohemian composer, born in Budweis, Feb. 19, 1763, died in Vienna in 1850. His talent enlisted the sympathies of an influential Hungarian nobleman, and of the illustrious Mozart, and his works were soon received with great applause, not only in Vienna, but in Paris, London, and the other principal cities of Europe. While in Naples he studied counterpoint under Sala. He was at the same time as well skilled on the violin as on the piano. In 1804 he was appointed director of the orchestra of the imperial theatre in Vienna. Among his operas are "Semiramis," "Agnes Sorel," "The Ocellist," "The Blind Harpist," &c. He also composed melodramas, ballets, numerous instrumental works and vocal pieces, but excelled most in symphonies. His autobiography appeared in Vienna in 1848.

GYULA, a market town of E. Hungary, co. of Békés, 35 m. N. N. W. from Arad; pop. 14,700. It is divided by the White Körös river into 2 distinct villages, Magyar and Nemet (German), in one of which Hungarian and in the other German is principally spoken. It has a Greek united, a Greek non-united, and a Protestant church, a castle, a court house, and several oil mills. The vine is extensively cultivated in the neighborhood, and there is a good trade in wine, salt, and cattle.

GYULAI, FRANZ, count, an Austrian general, of an ancient Transylvanian family, several members of which have distinguished themselves in the military service of the empire, born in Pesth, Sept. 1, 1798. The son of Count Ignatius Gyulai, who successively held the im-

portant offices of ban of Croatia, Slavonia, and Dalmatia, of *Feldzeugmeister*, and of president of the aulic council, he entered the army after the last war against Napoleon, and, though serving only in time of peace, was rapidly promoted to the rank of major in 1827, of lieutenant-colonel in 1830, of colonel in 1831, of major-general and brigadier in 1837, and of lieutenant field marshal in 1846. In 1847 he received the military command of the Austrian Littorale, and successfully exerted himself in defence of the imperial navy, and of Trieste, his headquarters, against the repeatedly attempted attacks of the Sardo-Neapolitan flotilla in the service of the Italian revolution, in the spring of 1848. For these services he received various marks of distinction from the emperor, and also the order of St. Januarius from the king of Naples, his nominal enemy. In the following year he was appointed minister of war during the Russian intervention in Hungary, where he personally witnessed the taking of Raab in the suite of Francis Joseph. In July, 1850, he resigned his ministry to take command of the 5th army corps in Italy, and was soon after also appointed military and civil commander of Milan. The

latter office he administered with the utmost rigor. In 1857 he became the successor of Radetzky as commander-in-chief of the second or Italian army, and subsequently also of the archduke Ferdinand Maximilian as governor-general of Lombardo-Venetia. He maintained this double position at the outbreak of the Franco-Sardinian war against Austria in 1859, in spite of the general want of confidence in Austria regarding his capacity to lead a great army. But his vacillating manœuvres after the unexpected invasion of Piedmont (April), his monstrous proclamations to the inhabitants of the invaded provinces, including Parma, which threatened death for the slightest offence against Austria, and the successive defeats of his army, the finest and most numerous that Austria ever sent into the field, at Montebello (May 20), Palestro (May 31), Magenta (June 4), and Melegnano (June 8), soon proved that the public had been wiser than the advisers of the emperor, who too late deprived him of the command of the army (June 17). He fought at the head of the regiment bearing the name of his family in the great battle of Solferino (June 24), which decided the campaign. (See FRANCIS JOSEPH.)

## H

**H**, the 8th letter in the Phœnician and kindred graphic systems, is named *Heth* or *Cheth* in the Hebrew, and *Haut* in the Ethiopic syllabarium. In the last named it is the 3d letter, its harsher sound there being the *Harm*, the 11th character, and *Kha* of the same import holding the 18th place in the Amharic syllabarium. According to Philo Byblius it was sacred to Hadal or Saturn in Phœnicia. Its Phœnicio-Aramaean figures are the prototypes of the modern letter. In the later or square form of the Hebrew it differs from the 5th letter (*He*), to which it is closely related, by being closed at the left angle. In Arabic its rough sound is written with *Kha*, the 7th letter, its milder one with *Ha*, the 6th, and the mildest with *He*, the 26th; but *Kha* verges toward K, and *He* toward E. The hieroglyph of the harsher sound is a sieve, and those of the milder a chair and the plan of a house. It occurs as a letter in the ancient Greek inscriptions, as for instance in HEKATON (hence H had sometimes the value of 100), ΗΟΣ, ΗΑΜΑ, ΕΝΗΘΙΑ, ΤΑΗΟΣ (and ΤΑΦΟΣ), &c., which are now written with a *spiritus asper* or without any mark, as ἑκατον, ὄς, ἄμα, ἐνοῖα, ταῶς. It was also written in the combination KH, ΠH, TH, before the introduction of the letters X, Φ, Θ. The H as a sign of double *es* or long *e* is attributed to Simonides. (See E.) The Greek spiritus marks are probably derived from H, its left half (I) having been altered into, as πνεῦμα δασυ (*spiritus asper*), and the right half (J) into, as πνεῦμα ψιλον (*spiritus lenis*), which is analogous to the Semitic *aleph* or *elif*.

The Septuagint wrote Βηθλεεμ for Bethlehem. It was harsh in the Etruscan, where, as well as in the Umbrian, it had the Aramaic shape. It is the 18th letter in Armenian, the 7th Rune (*Hagel*, hail), the 24th of the Glagolitic Azbuki, but is wanting in the Cyrillic and Russian, where its substitute is *Chier*, the 22d letter. The Poles use it only in foreign words, employing the hard *g* in place of the Slavonic, Cechic, and Lusato-Wendic *h*. (See G.) In the Devanagari H is classed with the sibilants, alternates as a sound with the Visarga (*s*), and is inherent in certain letters which we transcribe by *kh*, *gh*, *chh*, *th*, &c. Most of the Indian graphic systems, as well as the Thibetan, Mantchoo, Burmese, &c., are analogous in this respect.—The Romans began to use H in their 7th century, both as a letter for its proper sound and as a mark in transcribing the Greek letters X, Φ, Θ, and by analogy the ρ, as in *rhetor*, *Rhodus*. We employ it in the same instances, as well as in writing Egyptian, Hebrew, and Phœnician words; for instance, *Pharaoh*, *cherub*, *Sancho-niathon*, &c. The Italians, Spaniards, and Portuguese, however, omit the H in ancient words, writing *Filadelfia*, *Teodoro*, *coro*, &c. In Coptic there are two letters, viz., *Khei* for the harsh sound, and *Hori* for the mild one, both derived from hieroglyphs.—The sound which H indicates is the spiritus or breathing of the guttural series, wrongly called an aspirate. This sound is produced by a strong expiration, while the glottis is relaxed, so that the breath but slightly touches the soft parts of the voice-char-

nel. The raising of the root of the tongue renders the sound harsher, like the Greek  $\chi$ , the Hebrew *Cheth*, the German *ch* after *a*, *o*, *u*; and the Spanish *jota*. By raising the middle of the tongue, we utter the slighter sound. If the larynx vibrates at the same time, we pronounce the Semitic *ain*. This peculiar sound, which is, strictly speaking, neither a vowel nor a consonant, may be classed with the snapping lingual sounds of the Hottentots. Court de Gébélin imagines it to represent the second source of life. It is cognate with the *a* sound, while the consonant *j* (English *y* as in *yes*) belongs to *i*, and *e* to *u*. Varro calls it an *afflatus*; others a consonant or a spiritus. The Greek poets elided the last vowel before an initial *spiritus asper*; the Romans very frequently did the same, and sometimes lengthened the syllable preceding a consonant followed by *h*. It is silent at the end of syllables, as in *oh*, *ah*, *proh dolor*, &c. The Romans varied in its use, writing sometimes *honera*, *harena*, *harundo*, &c., instead of *onera*, *arena*, *arundo*; or, on the contrary, *ic*, *eredes*, *aruspea*, *erua*, *aëneus*, *Annibal*, *Adria*, *Olo*, &c., for *hic*, *heredes*, *haruspex*, *horus*, *aheneus*, *Hannibal*, *Hadria*, *Otho*. We find also *mehe* for *me*, *michi*, *mi*, for *mihi*, *nichilum* (*nec hilum*) for *nihilum*, *Pilippus*, *coora*, *trumpus*, *pulcer*, *Cetagus*, *Kartago*, &c. Cicero disliked the use of *H*.—The following are examples of the substitution of other letters for *H*: Gr.  $\epsilon\chi$ ,  $\epsilon\pi\tau\alpha$ ,  $\upsilon\varsigma$ ,  $\epsilon$ ,  $\eta\mu$ ,  $\alpha\lambda\varsigma$ ,  $\eta\lambda\iota\omicron\varsigma$ , &c.; Lat. *sez*, *septem*, *eus*, *ee*, *semi*, *sal*, *sol*. Arab. *rathah* and *rathach* (to break); Hebr. *gil*, *hul*, *hil* (to turn, twist, leap); *gabäl* and *hâbil* (to twist), &c.; Lat. *traho*, *veho*, *tractum*, *vectum*, and *traxi*, *vezi*, &c. *Hermandica* begat Salamanca. Gr.  $\upsilon\alpha\kappa\upsilon\iota\omicron\iota\omicron\rho$ , Lat. *vaccinium*. *Digitus*, *decem*, *ducere*, *cornu*, *cor*, *cervus*, *collum*, *cutis*, *crinis*, *cerebrum*, &c.; Germ. *Zeh*, *zehn*, *ziehen* (*zog*), *Horn*, *Horn*, *Hirsch*, *Hals*, *Haut*, *Haar*, *Hirn*. Old German, *he*, *het*, now *er*, *es* (*is*, *hic*, *hac*, *hoc*), *Michilensburg*, now Mecklenburg. (See F, G.) The Gothic initial *h* before *l*, *n*, *r*, has been dropped in the later dialects, and thus *hlusfan*, *hlaida*, *hraiseins*, &c., became the German *laufen*, *Laib*, *rein*. Similarly the Icelandic *hlíod* is the Germ. *Laut*, while *hláter* is *Gelächter*; *hnoda*, *kneten*; *hnukr*, Eng. *knuckle*, &c. So the Frankish *hlotar* *Hrudolf*, *Hludovic*, &c., became Lothar, Rudolph, Louis (Chlodevic, Clovis, Ludwig, Lovis). The people of St. Malo in Brittany say *hloche*, *hlé*, for *cloche*, *claf*. So *Hrabanus* became Rabanus. The Anglo-Saxon, Icelandic, Danish, and Swedish *hv* or *hw* (coradical with the Latin *qu*) is written in English *wh*, thus: A. S. *hwit*, Icel. *hvitr*, Dan. *hvít*, Eng. *white*; Dan. *hvílke*, *hvæden*, &c., Eng. *which*, *whence*.—In modern German the *h* is often but a prosodic sign of length, as in *thun*, *Thal*, *führen*, *fahren*, to do, dale, Lat. *ferre*. It is a phonetic expedient in the English *ch*, *gh*, *sh*, *th*, in such words as *church*, *gherkin* (Germ. *Gurke*), *shoe* (Germ. *Schuh*), *think*, *this* (Germ. *denken*, *dieser*), or useless, as in *ghost* (*Geist*, gas), &c.; it is silent with *g* in

*ight*, *weight*, &c. The French is not less inconsistent; for the *ache aspiré* is as much mute as the *ache muet*, from which its effects differ by causing a hiatus, as in *le hasard* (without elision), as distinguished from *l'heure*; and this even in words of the same essence, as *le héros*, but *l'héroïne*. In Italian only 4 forms of the verb *avere* are written with *h*, viz.: *ho*, *hai*, *ha*, *hanno*, which Metastasio wrote *d*, *ai*, *a*, *anno*. The Spanish *h* is silent, whether it be Latin, as in *hombre* (*homo*), or from *f*, as in *hambre* (*fames*), or *g*, as in *hermano* (*germanus*); but *g* sounds like *h*, as in *genero*, and *j* and often *a* more harshly, as in *Mexico*, or *Mejico*, or *Megico*; and *ch* sounds as in English, as *mucho* (much).—As an abbreviation, *H*. stands for Hadrianus, Hostilius, Hispania, *hic*, *hæc*, *hoc*, *homo*, *habet*, *honos*, &c.; *HH*. for *heredes*; *HS*. for *sestertium*. On French coins it designated La Rochelle; on those of Austria, Gunsburg. It was the last nundinal letter. It was also used for 200, and  $\overline{H}$  for 200,000. In German music, *H* denotes the 7th diatonic interval, or the 12th string of the chromatic scale. This note was anciently *B*, and is so yet in Dutch and English music; but after the introduction of the chromatics, both itself and its flat (which was first contrived) being named *B*, in order to distinguish them, one was made of square shape. From this *B quadratum* was formed the  $\natural$  (French *dé carré*) and the German *H*, while its flat became  $\flat$ , whence the sign  $\flat$  (French *dé mol*).

HAARLEM, HAERLEM, or HARLEM, a city of Holland, in the province of North Holland, situated on the navigable river Spaarne, 8 m. from the sea, 10 m. from Amsterdam, and 17 m. from Leyden, with both which cities it communicates by canals and railways; pop. 28,800. In 1740 it had 40,000 inhabitants; in 1819, 18,000; since which date it has been increasing. Its trade is considerable; it possesses manufactories of cotton, silk, linens, velvets, ribbons, damasks, lace, jewelry, sail cloth, and soap, and has refineries of salt, tanneries, and dye works, and a celebrated foundry of Hebrew and Greek type. Prior to the discovery of the art of bleaching by chlorine, Haarlem enjoyed celebrity for its bleacheries. The city is well built, clean, and intersected by canals. A picturesque gateway on the high road to Amsterdam is a part of the old fortifications; the ramparts have been converted into public promenades. Most of the public edifices are built around a handsome square, in the centre of which is a bronze statue to Laurens Coster, whom the Dutch regard as the inventor of printing. The principal buildings are the town hall, formerly the residence of the counts of Holland, the palace of the states-general containing a gallery of paintings, and 9 Roman Catholic and 6 Protestant churches. St. Bavon's church, erected in the 15th century, is the largest ecclesiastical edifice in Holland, and is celebrated as containing the great organ constructed by Christian Müller of Amsterdam in 1788, and which until lately enjoyed the fame of being the largest in

the world. This instrument has 5,000 pipes and 60 stops, 3 rows of keys, and a pedal board. It is rivalled in magnitude, however, by the organs at York and Birmingham, and in sweetness, according to some critics, by those of Rotterdam and Freyburg. Free public performances are given weekly. In addition to the organ, the church contains a rood screen with some curious carving, a modern group of statuary representing faith, hope, and charity, and the tomb of the poet Bilderdijk. Haarlem is the headquarters of the society of national education, which has here its school for teachers. The principal scientific and literary institutions are the botanical garden, numerous public schools, a college and academy of arts founded in 1752, the Teyler institute, possessing a museum, with lectures, and a picture gallery, which contains a valuable collection of engravings, especially of Ostade's, and the most complete collection of electrical apparatus in Europe. The environs of the city are very pleasing. The canals being bordered with trees adds to the beauty of the scenery, and many of the buildings, having high roofs with peaked attic windows, are picturesque in appearance. Three lines of railroad and a high road bordered with willows, running side by side as far as the eye can reach, add a singular feature to the landscape. In the suburbs is the royal chateau of Welgelegen, formerly the residence of King Louis Bonaparte. S. of the city lie the tulip gardens (*Bloemen Tuinen*), for which Haarlem is famous. Although fortunes are no longer given for a single root, a large amount of capital and skill are employed in raising them, and most of Europe is supplied with flowering bulbs from this source.—Haarlem dates back to an early but uncertain period. It was a flourishing town in the middle of the 12th century, and figured in the wars between the Dutch and West Frislanders. Fires damaged the city in 1347, 1355, and 1387. The revolted peasants seized it in 1492, but lost it the same year. In the revolt of the Netherlands against the Spaniards it joined the allies, and was in consequence besieged by the troops of the duke of Alva, under the immediate command of his son Frederic of Toledo, in 1572-'8. The citizens made one of the most heroic defences on record. After 7 months' siege, during which the Spaniards lost 10,000 men, and twice breached the walls, but were unable to obtain entrance, they turned the siege into a blockade, and placed a fleet on the lake to cut off supplies, when the garrison, which originally numbered 4,000, including some German auxiliaries and a corps of 300 women under the heroine of the hour, Kenau Hasselaer, were reduced to 1,800, and the last mouthful of food was eaten, the gallant burghers proposed to place the women and children in the centre, fire the city, and cut their way through the besiegers. Fearful of losing even the barren semblance of victory, the Spaniards offered terms if they would surrender the place. The proposal was accepted; Alva's troops

marched in, disarmed the inhabitants, and in violation of faith proceeded to the most atrocious massacre. The 57 hostages were put to death, and 4 executioners were kept constantly busy until they ceased from fatigue after 2,000 persons had been butchered, whereon 300 remaining victims were tied in twos, back to back, and cast into the lake. Frederic had his father's order for the massacre when he offered the amnesty. William of Orange retook the city in 1577. During the occupation of the French in the present century it suffered much in its commerce.

**HAARLEM MEER, or LAKE OF HAARLEM,** a lake 14 m. long and 10 m. broad, covering 70 sq. m., communicating S. with the Zuyder Zee by an inlet called the Y, and N. with the Old Rhine, and occupying, with an average depth of water of 13 feet, the area between the cities of Haarlem, Leyden, and Amsterdam. This sheet of water was formed in the 16th century by an inundation which united 4 ponds into one, and destroyed several villages. It gradually encroached on the land, till in the 19th century it covered 45,000 acres. Its shallow waters were liable to be agitated by storms, and, being carried along by the winds over the adjoining low lands, threatened destruction to the towns on its coast. The levees, kept in repair at an annual cost of \$20,000, proved ineffectual to arrest its flow. In Nov. 1836, a westerly storm impelled the waters upon the city of Amsterdam, and in the month following another gale laid the streets of Leyden under water. In 1839 the government accepted the offer of an English engineering company to drain the lake. The process was begun in that year and completed in 1852, when the bed of the lake was left dry, except a channel way of 700 acres; 41,675 acres of good land were reclaimed. (See DRAINAGE.)

**HAAS, JOHN PHILIP DE,** an American general, born in Holland about 1735, died in Philadelphia about 1794. He was descended from an ancient family of northern France, which had removed to Holland, and in 1750 accompanied his father to America, settling in Lancaster co., Penn. In his youth he showed a taste for military life, and upon the breaking out of the old French war, as the 7 years' war was called in America, attached himself to the provincial forces. In 1758 he was commissioned an ensign in the regular regiment raised by Pennsylvania for the war, and in Aug. 1763, participated in the bloody conflict with the Indians of the western nations at Bushy Run, near Pittsburg. At the outbreak of the American revolution he was appointed colonel of the 1st regiment of the Pennsylvania line, and in 1775-'6 rendered important services in Canada. He subsequently took part in the battle of Long island, and in Feb. 1777, was with Wayne and others appointed a brigadier-general by congress. He served in various capacities with credit until the close of the war. The latter years of his life were passed in Philadelphia.

**HABAKKUK**, one of the 12 minor prophets, of whose birth or death we know with certainty neither the time nor the place, but who is supposed to have lived in the reign of Jehoiakim, about 600 B. C., being thus contemporary with Jeremiah. The prophecy of Habakkuk is the 85th in the order of the books of the Old Testament, and relates chiefly to the invasion of Judaea by the Chaldeans. The style is highly poetical, and the ode or prayer of the 8d chapter is probably unrivalled, not only for splendor of diction and subject, but for sublimity, simplicity, and power.

**HABEAS CORPUS**, an ancient English writ, used for a variety of purposes from the remotest antiquity. It is addressed to a sheriff or other officer, and commands him to have the body of the person named at a certain place and time. When all writs were in Latin, the characterizing words of this writ were *ut habeas corpus*, and the name has long survived the use of these words in the writ. One of the purposes for which it was used was to recover freedom which had been wrongfully taken away. Personal liberty was always asserted by the common law from its earliest ages; and it was always assailed by kings who would be tyrants, and with an earnestness proportioned to their tyranny. Hence it became necessary to declare this principle in the most solemn manner in *Magna Charta*. It is there said that "no man shall be taken or imprisoned but by the lawful judgment of his peers, or by the law of the land;" and this clause, more than any other, has given to that instrument the name of the palladium of English liberty, a name which is deserved rather by the writ of habeas corpus. For, on the one hand, the great charter did not enact this as a new rule of law, but only declared it to be the law of the land; and, on the other, its force and influence gradually faded, in despite of repeated formal confirmations; and this law became actual and operative only by means of the habeas corpus. This writ was issuable from the king's bench; and it was used to protect or restore liberty, by bringing the prisoner before the court, whose duty it was to order his immediate discharge if he were not restrained of his liberty according to law. But it was evaded by courts and sheriffs who were disposed to support royal or ministerial usurpations; and it became so powerless, that early in the reign of Charles I. the court of king's bench formally decided that they had no power to release any person imprisoned without any cause assigned, if he were imprisoned by the express command of the king, or by the lords of the privy council. The petition of right, of the 3d year of the reign of Charles I. (1628), asserted this illegality of the decision, and declared that "no freeman should be imprisoned or detained without cause shown, to which he may make answer according to law." But the means of enforcing this rule were still imperfect, and personal liberty was still violated; and by 16 Charles I., ch. 10, va-

rious provisions were enacted, intended to make the writ of habeas corpus more effectual. But this was not enough. The judges still continued to refuse the writ at their pleasure, or to insist that it could be issued only in term time; and prisoners were sent to distant gaols, and sheriffs and gaolers refused to obey it; or if the party imprisoned were brought before an examining court, his liberty was still withheld on frivolous pretences. At length, in the 81st year of the reign of Charles II. (1679), what is now always understood by the habeas corpus act was enacted. It consisted of a variety of provisions, devised with so much skill and so well adapted to give each other mutual support, that it may safely be asserted that personal liberty will be safe, in England and the United States, so long as this law remains in force. Evasion of it is almost impossible; and it can be made ineffectual only by a positive and open violation of its essential provisions, or by a distinct denial of its interposition. Before stating more particularly what these provisions are, there are two points which should be noticed. One is, that we owe this admirable law to Lord Shaftesbury, who, when he was appointed lord chancellor, had received no legal education whatever, and made no pretence to any knowledge of technical law; nor could his best friends, then or since, claim for him the credit of any especial regard for liberty, or any moral excellence whatever. It happened, however, that his personal purposes at the moment were such as to induce him to make this law as practical and as effectual as possible; and he brought to this object all the resources of his genius and experience, and by their help succeeded in giving to the act an efficiency which the lawyers who had been at work upon it for many generations had never been able to impart. The other point is, the manner in which it was finally enacted. The house of commons were in favor of it; the house of lords were opposed to it; and the way in which their hostility was rendered ineffectual, and their actual dissent so converted into an apparent assent as to give validity to the law, is fully stated by Bishop Burnet in his "History of his own Times." The seeming impossibility of the transaction, and the incredibility of the narrative, have made it one of the causes for the general belief that this pleasant but somewhat gossiping history was untrustworthy; a belief which recent investigations have set aside. The story is this. The bill had passed the house of commons and was taken to the lords. When the question was about to be taken in that house, "Lords Grey and Norris were named to be the tellers. Lord Norris, being a man subject to vapors, was not at all times attentive to what was doing. So, a very fat lord coming in, Lord Grey counted him for 10, as a jest only at first; but seeing Lord Norris had not observed it, he went on with his misreckoning of 10, and so it was reported to the house, and declared that they who were for the bill were in a majority, though



it indeed went on the other side." Shaftesbury, who presided as lord chancellor, then spoke until members had come and gone, so that the house could not be retold and the mistake corrected. The bill was approved by the king, and became a law. In the Oxford edition of Burnet's "History," Onslow says, in a note to this passage, that the minute book of the house of lords, in regard to this bill, by comparing the number of lords present with the number reported, shows the story to be true. Lord Campbell, in his life of Lord Shaftesbury, says that there must have been some mistake in the return, because the journal shows that the whole number was 107, and it was declared 57 to 55. It would seem therefore to be certain that the habeas corpus act was passed by a foolish jest and a shameless falsehood. The English statute has been copied in the United States, without essential change; the variations from it being only such as would, in the opinion of the various legislatures, make its provisions more stringent, and the security it gives to liberty more certain and available.—The provisions of the statutes of habeas corpus, now in force in the different states, may be stated generally thus: 1. The writ commands the sheriff, or other person to whom it is directed, to have the body of the person who is said to be restrained of his liberty forthwith before the justice issuing it, or some other tribunal competent to try the questions the case may present; and to summon the person restraining the alleged prisoner to be there also, and bring with him the cause of the restraint; that all parties may then and there submit themselves to whatever may be lawfully adjudged and ordered in their behalf. The language varies in the different statutes which give the form of the writ; but it is always substantially as above. 2. The writ must be granted, as of right, by any of the justices of the higher courts, and, in their absence or inaccessibility, by any of those of a lower court, down to justices of the quorum; the law covering in this respect a wide range, so as to insure to every applicant some one from whom this redress or remedy may come. 3. It must be granted at any time when it is prayed for, whether a court be sitting or not. 4. It must be granted either to the party himself restrained of his liberty, or to any one applying for him; and if his name be unknown, the best description which can readily be given is sufficient. 5. The application must be in writing, and must be verified by the oath of the applicant. 6. The sheriff or other officer to whom it is directed must render prompt obedience, and make immediate service, and return the writ forthwith with a full statement of his doings. 7. It must be returned before the proper magistrate at chambers, if a court to which it is made returnable be not then in session. 8. Upon the return, the alleged prisoner being present, the case is tried; and unless sufficient cause for his imprisonment is shown, he is ordered to be discharged at once. 9. If not wholly discharged,

the court or magistrate may order him to be discharged on giving reasonable bail, if he be held for any bailable offence or cause. 10. In some of the states, it is provided that the writ may not issue if the party restrained be imprisoned for crime, or in execution civil or criminal, and by lawful warrant. In others, these exceptions are not made, but if facts like these appear on trial, the prisoner is remanded. 11. In general, after a party has been discharged on habeas corpus, he cannot be again imprisoned or restrained of his liberty for the same cause. 12. The issuing of the writ by the magistrate applied to, and prompt and full obedience to it by the officer or other person to whom it is directed, are secured by very heavy penalties; and also by the fact that any applicant to whom the writ is refused by one magistrate may apply to another, and the number of those to whom he may thus resort is so large that it is hardly possible for them all to be corrupted, or for any reason indisposed to render due obedience to the law.—The vast importance of this law can be appreciated only by those who have studied the history of despotism; although it discloses only what might have been inferred with almost equal certainty from the reason of the thing. Whether the ruling authority of a nation (be it in the hands of one or of many) shall be absolute, or subordinated to law, must depend, in the last result, upon its power over the persons of those who are subject to it. Whatever be the law, if there be a sovereign who may disregard it, and put in strict imprisonment those who would resist him; if he may substitute his own commands for law, and take away from society and from all power of resort to law those who do not obey him; it is perfectly obvious that there can be no disobedience and no resistance which is not rebellion if it be put down, or revolution if it succeed. The histories of France and of England offer the most perfect illustration of this. Beginning from the feudal ages, they stood then about upon an equality in respect to the power of the sovereign and the personal rights of the subject. Under some of her monarchs, of the Plantagenet and Tudor families, England seemed to be yielding herself up to a more absolute tyranny than was known to her neighbors. But as the ages went on, it became apparent in France that the subjection of the citizen to the sovereign became with every generation more complete. By insidious rather than open increase, the power of the king, or rather the power of ministers who acted in the name of the king, to imprison at their pleasure whom they would, for political or personal, public or private reasons, became so entirely established, that every minister of the crown had, it is said, a large number of blank *lettres de cachet* (or letters under the privy seal of the king) which he could fill with names at his pleasure, and by which the police were authorized and commanded to imprison the party named and hold him in prison at the pleasure of the minister. The Bastille became a

recognized instrument of state; and in its cells lay those who were placed there only at the suspicion or the caprice of some minister, and who remained there only because they were forgotten. Of course this state of things could not last; for no one acquainted with human nature could doubt that such irresponsible and enormous power would be enormously abused, and lead its possessors into folly and insanity. Therefore the French revolution came to do the work which must be done, and only revolution could do, and therefore the reign of terror almost necessarily replaced the gilded and graceful despotism which had been its parent. But this, too, could not endure. Perhaps the changes which have since taken place, and which have given to that country almost every possible form of government, agree only in this: they prove that there is not that training for personal liberty, that inwrought determination to be personally free at all hazards, and in some way or other, which can become a part of the life-blood of a nation only after many generations, and can alone effectually secure, and preserve permanently, that blessing of personal liberty, which is fruitful of all other good. If we now turn to England, we shall see that in the Anglo-Saxon times despotism was rarely attempted, and never successful; that the laws and institutions of those days are all founded on the presumption of personal liberty and rights; that this element of character might for a time be suppressed or enfeebled, but that it could never be annihilated; that it rose from time to time into prominence and activity, and, as opportunity offered or could be made, gradually asserted itself, first in the fact of a common law, which the courts regarded as binding upon them; then in the recognition of personal liberty and right as an unquestionable principle of the common law; then by such timely assertions as in Magna Charta, in the petition of right, and finally in that act of habeas corpus, which we may well hope has settled the question for all time. And if it be remembered that this act seems to have been obtained by a jest and a falsehood, and to be due to the genius of one who was himself no lover of human rights, it must be remembered also that Shaftesbury was actuated by the conviction that he could in no way do so much to confirm his power and popularity as by preparing this law, which the training and character of the people taught them to demand and appreciate. It was they who made the law, and the lord chancellor of the day was but their instrument.—That the habeas corpus act is sufficiently valued in the United States may be inferred from the fact that the federal constitution (art. I., sec. 9, No. 2) provides that "the provisions of the act shall not be suspended, unless when in case of rebellion or invasion the public safety may require it;" and there is a provision to the same effect in some of the state constitutions. Everywhere the statute itself is enacted, and, so far as words can have the effect, made stringent and effectual.

—The technical name of this writ is *habeas corpus ad subjiciendum*, from the requirement contained in it that the alleged prisoner and the persons restraining him should "submit themselves to the order of the court." It is sometimes called also *habeas corpus cum causa*. *Habeas corpus ad testificandum* was formerly used to compel witnesses to testify in certain cases, and *habeas corpus ad satisfaciendum* was employed to obtain satisfaction of certain judgments. But these are now obsolete. This writ is now frequently resorted to by parents of minors who have enlisted without their permission, by parents who wish to obtain possession of children withheld from them, and for similar purposes. It is also the instrument by means of which the legality of the proceedings by which possession of an alleged slave is sought, may be tested. It has been solemnly decided that the habeas corpus act can be suspended only by a legislature; and that the proclamation of martial law by a military officer is not sufficient.

**HABENDUM** (Lat. *habeo*, to have), the clause in deeds of conveyance which declares what estate the grantee takes, and for whose use he holds it. It was always coupled with *tenendum* when deeds of conveyance were written in Latin; and the common translation now in use is: "To have and to hold, the estate aforesaid (or the same, or the premises), to the grantee and his heirs, to and for his and their use." A habendum may, in some cases, enlarge the estate conveyed in a previous part of the deed, but must not be repugnant or contradictory to it. Its proper office is to give nothing, but to define and limit what is elsewhere given.

**HABERSHAM**, a N. E. co. of Ga., bordering on S. Carolina, and containing the sources of the Chattahoochee, Broad, and other rivers; area, 700 sq. m.; pop. in 1852, 9,768, of whom 1,281 were slaves. It is traversed by branches of the Blue Ridge, between which are fertile valleys. Iron is abundant; rubies, carnelians, and occasionally diamonds have been found; and the gold mines, of which there were 8 in operation in 1850, are among the richest in the state. The value of gold obtained that year was \$5,490. The productions in 1850 were 268,695 bushels of Indian corn, 48,688 of oats, and 57,491 of sweet potatoes. There were 22 grist mills, 8 saw mills, 89 churches, and 1 newspaper office. Organized in 1818, and named in honor of Col. Joseph Habersham, speaker of the general assembly of Georgia in 1785. Value of real estate in 1856, \$774,518. Capital, Clarksville.

**HABINGTON**, WILLIAM, an English poet, born in Hindlip, Worcestershire, Nov. 5, 1605, died there, Nov. 18, 1645. Belonging to a Roman Catholic family, he was educated at the Jesuit college of St. Omer, and at Paris, with the view of inducing him to enter the order; but he showed no inclination for a life of celibacy, and, returning to England, married Lucy Herbert, the daughter of Lord Powis. Although Habington belonged to a family noted for plotting, he seems to have taken little interest in

political affairs. He lived mostly in the country, and his life passed quietly. His poetry is such as might be expected from the tenor of his life, smooth, easy, and void of passion. He is an exception to the licentiousness of his contemporaries, but fell into the prevailing error of overstrained and far-fetched conceits. His works are: "Castara," a collection of poems addressed to his wife (4to., London, 1634; with a preface and notes by Charles A. Elton, 12mo., Bristol, 1812); "The Queene of Aragon, a Tragi-comedie" (fol., London, 1640), which was acted at court, and at the Blackfriars theatre, and revived in 1666 with a prologue and epilogue by Samuel Butler, the author of "Hudibras"; "The Historie of Edward IV." (1640), said to have been partly written by the poet's father; and "Observations upon the Historie of Henry the Second's Association of his eldest Sonne to the Regal Throne" (8vo., 1641). The poems of this author are given in Chalmers's edition of the British poets, and Southey's "Select British Poets." Habington's father was implicated in Babington's conspiracy, his uncle suffered death for his share in the same affair, and his mother, a daughter of Lord Morley, is believed by some to have written the letter to her brother Lord Montague which led to the discovery of the gunpowder plot.

HACHETTE, JEAN NICOLAS PIERRE, a French mathematician, born in Mézières, May 6, 1769, died in Paris, Jan. 16, 1834. At the age of 19 he was made designer to the professors of physics and chemistry at the engineering school of Mézières. In 1792 he became professor of hydrography at Colloure, and in 1794, on the establishment of the polytechnic school at Paris, he was made adjunct professor of descriptive geometry with Monge. In the same year he accompanied Guyton de Morveau to the army of the Sambre and Meuse, where it was in contemplation to apply the art of ballooning to military operations. He subsequently received the chair of mathematics in the *école des pages*, in 1809 was made doctor of sciences, and in 1810 adjunct professor in the Parisian faculty of sciences and the normal school. On the restoration he was dismissed from the polytechnic school on account of his revolutionary sentiments; and although elected a member of the academy of sciences in 1823, he was not allowed to take his seat until after the revolution of 1830. He retained his place in the faculty of sciences, however, until his death. Hachette's attention was mainly given to the development and application of Monge's system of descriptive geometry. He wrote many works on mathematics and physics.

HACKBERRY (*celtis occidentalis*, Linn.), the familiar name of a tree of the North American temperate zone, belonging to the *urticaceae*, or nettle family, and the *ulmaceae*, or elm tribe. Its general appearance is that of an elm, having drooping branches, inclined to spread horizontally, and a trunk covered with a grayish, rough bark. It is called in some parts of the country

false elm; and it also bears the names of beaver wood and hoop ash. In the south it obtains the names of sweet gum and sugarberry. The resemblance of its leaves to those of some kinds of nettles has also given to it the name of nettle tree. In thickets on river banks the hackberry runs up into a tall bush. In some instances it attains great size even in Massachusetts; and on the sea islands off Carolina and Georgia it reaches to the height of 60 and 70 feet, with a diameter of trunk varying from 2 to 4 feet. Elliott says that it occurs more plentifully along the margins of the sea islands than in any other region. It is subject to many varieties of appearance, and these have been considered as distinct species. The most prominent has larger, coarser leaves, and was supposed to be the *C. crassifolia* of De Lamarck, but according to Dr. Darlington that species does not appear to be well defined. A low and straggling form with very thin leaves and growing upon the rocky banks of streams is the *C. pumila* of Pursh. Both of these, together with the *C. Albertina* of Spach, have been considered mere varieties of the original species. In rich soils the hackberry becomes a beautiful tree. It is much esteemed in France for the rapidity of its growth; but in the United States, its original habitat, it is scarcely known even in its wild state. Its fruit is a brownish red drupe about the size of a pea, and filled with a sweetish, mealy pulp.

HACKET, JOHN, an English bishop, born in London in 1592, died in Lichfield in 1670. He was educated at Cambridge, was ordained in 1618, and soon after appointed chaplain to Lord Keeper Williams. In 1628 he was made chaplain to James I., and received various ecclesiastical preferments. On the outbreak of the civil war he espoused the cause of the royalist party, and after the restoration was made bishop of Lichfield and Coventry. On taking possession of his see, he found its cathedral in ruins, but in a short time entirely restored it, chiefly by contributions from his private purse and collections effected by himself. His most important works are a comedy called "Loyola," and a life of his patron Archbishop Williams.

HACKETT, HORATIO BALCH, an American biblical scholar, born in Salisbury, Mass., in 1808. He was graduated at Amherst college in 1830; pursued his theological studies at the seminary in Andover, which he left in 1834, and afterward at Halle and Berlin in Germany. He spent a year as tutor at Amherst college, and 4 years as professor of ancient languages at Brown university. In 1839 he accepted the chair of biblical literature in the Newton theological institution. In 1851-'2 he visited and travelled in Italy, Egypt, Palestine, and other countries. In 1858-'9 he resided several months in Athens, chiefly for the purpose of studying modern Greek, as auxiliary to the interpretation of the New Testament. This residence was combined with travel, especially to places in and near Greece possessing a biblical interest, as Corinth, Neapolis, Philippi, Thessalonica, and Smyrna.

His published works are, an edition of Plutarch, *De Sera Numinis Vindicta*, with notes (Andover, 1844); a translation of Winer's Chaldee grammar, with additions (8vo., 1845); "Hebrew Reader" (1847); a "Commentary on the Acts" (Boston, 1851; new ed. greatly extended, 1858); "Illustrations of Scripture suggested by a Tour through the Holy Land" (Boston, 1855). The last work has passed through repeated editions, and has been reprinted in England and Scotland. Prof. Hackett has also contributed largely to the "Christian Review" and the "Bibliotheca Sacra." He is at present (1859) a contributor on biblical subjects to a theological cyclopædia in England, and is revising some portions of the common version of the New Testament, in the service of the American Bible union.

HACKETT, JAMES HENRY, an American actor, born in New York, March 15, 1800. He appeared for the first time on the stage in March, 1826, at the Park theatre, New York, as Justice Woodcock in "Love in a Village," and soon became a favorite actor in broad comedy. In 1828 and again in 1832 he played a round of engagements in England with success, and in the intervals made professional visits to the chief cities of the United States. Between 1832 and 1845 he frequently appeared in his prominent parts, and in the latter year again visited England. In 1849 he was a joint manager with William Niblo of the Astor place opera house, New York, during the engagement of Mr. Macready which resulted in the Astor place riots. He was in London again during the great exhibition of industry in 1851, but since that time has appeared less frequently before the public. In 1854-'5 he was concerned in the management of the Grisi and Mario opera company during the visit of those singers to the United States. He was one of the first to introduce the Yankee type of the American character upon the stage, and is popular in such parts as Nimrod Wildfire in the "Kentuckian." He is also noted for his personation of Falstaff and other humorous Shakespearean characters.

HACKLÄNDER, FRIEDRICH WILHELM, a German author, born in Bartscheid, near Aix la Chapelle, Nov. 1, 1816, studied at Elberfeld, and accompanied Baron von Taubenheim to the East, the crown prince of Wurtemberg on a tour through Italy, Belgium, northern Germany, and Russia, Field Marshal Radetzky on his second Italian campaign, and the prince of Prussia on his expedition of intervention in Baden (1849), and in 1850 settled near Stuttgart. He has written numerous sketches, novels, plays, &c., principally relating to modern society and military life. Among his works are: *Bilder aus dem Soldatenleben im Frieden* (1841); *Daguerreotypen aufgenommen auf einer Reise in den Orient* (1842); *Pilgerzug nach Mekka* (1847); *Soldatenleben im Kriege* (1849); *Ein Winter in Spanien* (1855); *Der neue Don Quixote* (1858).

HACMATAC. See FR.

HADDINGTONSHIRE, or EAST LOTHIAN, a maritime co. of Scotland, bounded N. and E.

by the frith of Forth and the German ocean, S. by Berwickshire, and W. by Edinburghshire, or Mid-Lothian; area, 280 sq. m.; pop. in 1851, 86,886. The surface rises gradually, though with slight undulations, from the coast toward the Lammermoor hills. It is divided by the river Tyne into 2 nearly equal portions. The climate is healthful, but variable. Haddingtonshire has long been celebrated for the skill and success of its agriculturists. The soil is in general fertile. The low lands of the N. and W. are surpassed in productiveness by few places in the kingdom, but the districts adjoining the Lammermoor range are of lighter quality, and more adapted to pasturage than tillage. The principal crop is wheat. Potatoes are however extensively cultivated, and turnips here attain a perfection which they reach in no other part of Britain. Sheep and horned cattle are reared in the hill districts. There are no manufactures of any importance. Haddingtonshire sends one member to parliament.

HADDOCK. I. A soft-rayed fish of the cod family, and genus *morhua* (Cuv.). This well known species varies in length from 1 to 2 feet, and in weight from 2 to 6 lbs., though some have been taken weighing 17 lbs. The color is dark gray above and silvery gray below, with a jet black lateral line, and an oblong dark blotch on each side on a line with and just above the pectorals. The body is stout in the anterior half, tapering backward; the head is large, flattened between the eyes, and the snout prominent; the eyes large, with bluish iris; the upper jaw the longer, with several rows of sharp-pointed teeth, and a single row in the lower; a very minute barbule suspended from the chin. There are 3 dorsals, the 1st high and triangular, whence its name of *M. aglaffinus* (Linn.); the pectorals are triangular, and the ventrals are in front of them, under the throat; there are 2 anals, and the caudal is emarginated. The haddock is found everywhere on the American coast from New York to the arctic regions; they occur in immense shoals, often changing ground as their food becomes exhausted; they are found on our coast from spring to autumn, at the season when cod are scarce; taking the year through, probably 8 haddock are caught in Massachusetts bay to one cod; great numbers are brought to Boston market during the summer, and are largely consumed from their low price by the poorer classes. It is an excellent fish when eaten fresh, though it is less esteemed and considerably cheaper than the cod, and from its thinness is less valuable for salting. The spawning time is in early spring; its food consists of small fish, crustaceans, mollusks, and marine worms; from its voracity it is a ready biter, and affords excellent sport to the fisherman; the fishery is valuable to New England and the British provinces, and is pursued in the same manner as for cod, and in deep water. The haddock is equally abundant on the coast of northern Europe, and is very common in the English markets; it is found in the

arctic seas, supplying food to the inhabitants of Greenland, and to the seals and other aquatic mammals of the northern regions. In popular tradition, it disputes the honor with the dory of having been the fish from whose mouth St. Peter took the tribute money, the dark lateral spots being the marks of his finger and thumb. The French fishermen are said to call this fish *hadot*, from which our name is probably derived. The name "young haddock" is sometimes given to the pollock, a gadoid fish of the genus *merlangus* (Ouv.). II. The NORWAY HADDOCK is the *sebastes Norvegicus* (Fabr.), an acanthopteron marine fish of the family *sclerogenidae* or "mailed cheeks." It attains a length of from 1 to 2 feet; the body and the upper parts of the head are covered with scales; the gill covers are spiny; the teeth are numerous, small, equal, in both jaws, and on the vomer and palate bones; the single dorsal is partly spinous, as are the anal and ventrals. The color of the living fish is bright red, with a black blotch on the posterior part of the gill covers; after death the lower parts become white; the iris is yellow. It is found on both sides of the Atlantic, and on the American coast from New York (where it is rare) to the far north; it is called here rose fish, red perch, and snapper, and, though highly esteemed in Norway, is not eaten with us. It is abundant in Newfoundland, where it feeds on small fish; it takes the hook readily, and from there to Greenland is considered an excellent fish for the table. The spines of the dorsal are used as needles by the Greenlanders and Esquimaux.

HADES (Gr. *hades*, from *aides*, invisible), in Grecian mythology, a name originally given to the king of the lower or invisible world, but afterward applied to the infernal regions, while the king came to be known as Pluto. Hades was a place of darkness, the residence of Pluto and Proserpine, and the abode of the dead. Its gates were kept closed, that no shade might escape to the world of light, and were guarded by the terrible many-headed dog Cerberus.

HADJI, an Arabic word signifying pilgrim, *hadj* being the term used for pilgrimage, or for the whole body of pilgrims to Mecca. A certain part of the ceremony which takes place at Mecca on the arrival of the pilgrims is also called *hadj*. The Mohammedan theologians define the original meaning of *hadj* to be "aspiration," and they consider it expressive of the sentiment that man is but a wayfarer on earth travelling toward another and a better world. Every Mohammedan is bound, under certain conditions, once in his life to visit the holy city Mecca. Those conditions are, in general, adolescence, freedom, and sanity. Minors, slaves, and lunatics are exempt from the obligation of pilgrimage. According to some doctors of theology, however, only such of the faithful as have health and money for their expenses on the road, and for the support of their families while they are absent, are bound to perform the pilgrimage; others hold every Mohammedan bound if he is able to walk and to earn his

bread on the way; others, again, think it sufficient, in certain cases, to send a substitute whose expenses must be paid by the person sending. The essential part of the pilgrimage is the presence of the pilgrim during the preaching of a sermon on Mt. Arafat, 12 miles west of Mecca, in the afternoon of the 9th of the month Zu-el-Hadji. The *cadi* of Mecca is generally the preacher on this occasion. A Mohammedan who has made the pilgrimage commonly bears for the rest of his life the title of Hadji prefixed to his name—as Hadji Ibrahim, Hadji Mohammed. Five European Christians are known to have performed the pilgrimage to Mecca: 1. Lodovico Bartema, an Italian gentleman, who in 1603, while travelling in the East, won the friendship of a Mameluke captain at Damascus who was a renegade Christian. In his company Bartema, disguised as a Mameluke, made the pilgrimage without being suspected, and on his return published a quaint and picturesque narrative of his observations. 2. Joseph Pitta, an English boy, who while at sea in a merchant vessel was captured by Algerine pirates and sold as a slave in Egypt. His master converted him to a profession of Mohammedanism by means of the bastinado, and in 1680 took him as a pilgrim to Mecca. He obtained his freedom and returned to England, where he published an account of his adventures. 3. Giovanni Finati, an Italian in the service of Mohammed Ali, in 1814 accompanied the Egyptian army which recaptured the holy cities, Mecca and Medina, from the heretical Wahabees. He was unable to write, and dictated an account of what he saw to Mr. Bankes, an English traveller, by whom it was translated. 4. Burckhardt, who in the same year as Finati penetrated to Mecca in disguise, though not unsuspected; he was the first experienced and enlightened traveller that accomplished this feat. 5. Lieut. Richard F. Burton, of the Bombay army, who visited Mecca in 1853, disguised as a dervise, and has given the fullest and most accurate particulars of the religious observances of the pilgrimage, and descriptions of the holy edifices, in his "Personal Narrative of a Pilgrimage to El-Medina and Meccah" (3 vols. 8vo., London, 1856). The Spaniard Badi, who travelled in the East under the name of Ali Bey, professed to have visited Mecca in 1807, but the authenticity of his narrative is questioned.

HADLEY, JOHN, an English astronomer, died Feb. 15, 1744. The time and place of his birth, as well as the particulars of his life, are unknown. He is chiefly known as the reputed inventor of the instrument commonly called Hadley's quadrant, of which he published an account in the "Transactions" of the royal society in 1731. It is now believed, however, that Sir Isaac Newton and Thomas Godfrey are entitled to the honor of the invention. The claims of Godfrey and Hadley were investigated by the royal society, and it was decided that both were original inventors, and a prize of £300 was awarded to each. (See GODFREY, THOMAS.)

**HADRIAN**, or **ADEIAN** (**PUBLIUS ÆLIUS HADRIANUS**), a Roman emperor, born in Rome, Jan. 4, A. D. 76, died July 10, 138. His father, a Roman senator, married the aunt of Trajan; and when he died, Trajan, who had not yet succeeded to the empire, became one of Hadrian's guardians. He entered the army in early youth, and became a skilful soldier. When the emperor Nerva adopted Trajan, Hadrian, always an assiduous courtier, made a long journey to congratulate him; and the next year, Nerva having died, he travelled from upper to lower Germany, and was the first to announce this event to the new emperor. He next married Julia Sabina, granddaughter of Trajan's sister; and through this new connection, joined to the favor of the emperor's wife Plotina, he rose rapidly to various high offices at Rome. He followed Trajan in his expedition to Dacia, and was distinguished for his bravery. He was tribune of the people in 105, prætor in 107, and *legatus prætorius* of Lower Pannonia in 108. Soon afterward Trajan made him his private secretary, and probably selected him as his heir; but of this there seems to be some doubt. When, however, the emperor died, Hadrian was in command of the armies of the East, and was proclaimed emperor at Antioch, Aug. 11, 117. He immediately wrote to the senate apologizing for this haste, and asking their sanction of his election, which they at once gave. Hadrian's policy was pacific. He renounced the conquests made by the late emperor east of the Euphrates, concluded a treaty with the Parthians, and returned to Rome, where he celebrated a triumph in honor of his predecessor (118). Some warlike movements of the Sarmatians now drew him toward Dacia, but his progress was checked by intelligence of the discovery of a conspiracy at Rome, led by men of high rank. He directed the chief conspirators to be put to death, a severity which offended many. To recover his popularity, he cancelled the arrears of taxes for the last 15 years, and assured the senate that he would never again put to death a senator without their consent. In 119 he began his tour through the Roman empire, visited Gaul and Germany, and in Britain built a wall for the defence of the Roman province, which extended from Solway frith to the German ocean near the mouth of the Tyne (120). He then returned through Gaul, spent a winter in Spain, crossed into Mauritania, visited Egypt and western Asia, and finally paused at Athens for 8 years, where he was initiated into the Eleusinian mysteries, and presided at the public games. In this journey he won the favor of the provincials by his liberality, and by various public works which he planned and executed for their benefit. The Jews having revolted, he punished them with great severity. Judæa was desolated and reduced almost to a wilderness; the Jews were expelled from Jerusalem, and were forbidden to return thither, a Roman colony being planted in their place. His health declining, he chose Titus Aurelius, afterward Antoninus Pius, his

heir, but obliged him to adopt the son of Ælius Verus, and also M. Annius Verus, the future Marcus Aurelius. He had built a magnificent villa near Tibur, where he now passed much of his time. As death approached, his mind became evidently affected; he grew suspicious and cruel, offending the Roman nobility by needless severity. Hadrian was an able administrator of his vast government. His literary attainments were considerable, and he wrote and spoke with readiness. He was fond of literary men, and in his court were collected the chief authors and artists of the time. With some vices he joined generosity and a patriotic devotion to the welfare of his people. His subjects, except the Jews, everywhere felt his protecting care, and his wise policy spread peace and contentment throughout the Roman empire.

**HADRUMETUM**, or **ADRUMETUM**, an ancient city in northern Africa, on the sea coast, in the *sinus Neapolitanus* (gulf of Hammamet), founded by the Phœnicians. It was one of the chief ports for the corn-producing province of Byzacena, of which it was the capital under the Romans. It figured in the Punic and civil wars, was devastated by the Vandals, and was restored by Justinian under the name of Justinianopolis. Its site is supposed to have been the modern Susah, and its extensive ruins were to be seen in the time of the Arabian geographer Abu Obeid Bekri of Cordova, though they have since for the most part disappeared.

**HÆMOPTYSIS** (Gr. *haima*, blood, and *πτύω*, to spit), the spitting or raising of blood from the lungs or air passages; that coming from the mouth, palate, gums, tongue, and throat is not generally included under this term. Hæmoptysis may be a simple exudation from the mucous membrane without appreciable lesion, or may be caused by an organic lesion of the lungs; it is most common between the ages of 16 and 35, in the female sex, and in nervous and sanguine temperaments; it appears to be often hereditary, and is most apt to attack those whose professions require prolonged and forced use of the voice; other causes are violent muscular efforts, paroxysms of cough, blows or pressure on the chest, inspiration of irritating vapors or of the rarified air on high mountains; it is also symptomatic of the suppression of various natural and morbid secretions. It may be exuded from the tracheal or bronchial membranes, or may proceed from capillaries communicating with the air passages in any part of their extent; the amount varies from a drachm or two to as many pints at a time, and is generally florid and more or less mixed with air, differing from the dark coagulated blood which comes from the stomach in various diseases. An attack of hæmoptysis is frequently announced by a feeling of heat, and oppression in the chest behind the sternum, followed by a cough which brings up the blood; when the quantity is very great, it pours forth without cough, and almost by an act of vomiting, with considerable spasmodic effort. The effect of

profuse hæmoptysis is that of other great hæmorrhages, increased by the terror which spitting of blood always inspires. Bleeding from the lungs may occur without organic disease in plethoric and robust persons living a life of excitement and excess, and in nervous irritable individuals, weakened by mental or bodily fatigue and leading sedentary lives; this form is often hereditary, coming on like other constitutional hæmorrhages whenever the exciting causes are sufficiently powerful; this rarely proves fatal, unless from the persistence of the patient in his evil ways. Hæmoptysis sometimes takes the place of the suppressed menstrual or other discharges, and with the same relief to the system. Though spitting of blood sometimes occurs after the violent paroxysms of whooping cough, asthma, and chronic bronchial disease, and also in congestive affections of the lungs, it is *par excellence* the sign of tubercular phthisis or consumption, in the advanced stages of which it is extremely common; in rare cases, aneurism of the aorta breaks into the bronchi, causing a speedily fatal form of hæmoptysis; even in cases of phthisis death may be immediate, either from the quantity of the blood acting upon an anæmic state or producing suffocation. It is important to ascertain the source of the blood which escapes from the mouth, and, if determined to be from the lungs, to decide whether it is symptomatic of disease of these organs or merely vicarious in its character. The prognosis is generally serious, as it is so frequently connected with tubercular consumption.—Among the agents for arresting hæmoptysis are hæmostatics proper, of which the best is the essence of turpentine, 10 to 80 drops in a glass of water, or in a bolus with magnesia; this in a few hours will reduce, and in 36 hours will generally arrest the bleeding; it is less suitable for plethoric and young persons, with tendency to inflammations, than for debilitated and cachectic ones. Common salt, in a dose of 60 to 150 grains in a few hours, is an excellent popular remedy. The best astringents are tannin and gallic acid, the latter having all the styptic properties of the former without its constipating effect; a medium dose of gallic acid is 10 or 12 grains, in powders of 2 grains each, at intervals of two hours. Nauseating medicines, as tartar emetic and ipecacuanha, have long been used in restraining hæmorrhage; veratrine acts admirably as soon as nausea is established, and were there not equally efficacious remedies, not producing nausea, its use would be ranked among the best methods of treatment. A combination of digitalis and nitre is remarkable for its sedative effect on the circulation, and the consequent sure though slower arrest of the bleeding. In common cases, such remedies as salt, alum, sugar of lead, ergot, and ratany may be employed; but when the hæmorrhage is threatening, it is not safe to depend on any but gallic acid and turpentine. In all cases the treatment should be assisted by calmness of mind, rest, silence, erect position, cool air, drinks, and applications

to the chest, looseness of dress, and bandages or revulsives to the limbs, which will temporarily arrest the flow and give the remedies time to do their work. If cough be present, it should be quieted by narcotics. After the attack has ceased, astringent tonics, like iron and quinine, may be given, care being taken not to produce plethora. The return of the bleeding should be guarded against by avoiding the exciting causes, and attending to the rules of hygiene.

**HÆMORRHAGE** (Gr. *haima*, blood, and *haima*, to burst), an escape of blood from the vessels of the living body, called active or passive according as it is arterial or venous in character. Hæmorrhage may be natural, as in the menstrual discharge; symptomatic of disease, as in scurvy, typhoid fever, epistaxis, and hæmorrhoids; essential, inasmuch as the bleeding appears to constitute the principal disease, arising from and keeping up a degeneration of the vital fluid; and traumatic, when the blood vessels are wounded. Active hæmorrhage, when not traumatic, consists in an escape of blood from the capillaries, distended and ruptured by inflammation and excitement, as in bleeding from the mucous membrane of the lungs, nose, rectum, urethra, and from granulating wounds; this is accompanied by local heat, pain, tension, and general febrile condition. In passive hæmorrhage the blood is venous, as in chronic diseases of the liver, uterus, and rectum. There are certain persons called "bleeders," in whom a hæmorrhagic diathesis exists, a peculiar and often hereditary constitutional defect in which the blood seems to have no power of coagulation and the vessels none of contractility; in such the most trifling wounds are followed by profuse and sometimes uncontrollable and fatal bleeding. The symptoms of hæmorrhage vary according to its seat, whether external or internal, active or passive; the amount of blood lost is almost always greatly over-estimated by terrified patients and bystanders; in most acute attacks there are premonitory symptoms, constituting the so called *malum hæmorrhagicum*, such as chills followed by heat and fulness of the vessels of the part. A small loss of blood may produce great relief in congestions and inflammations, but hæmorrhage carried beyond this point causes paleness, chilliness, cold sweats, nausea and vomiting, hurried respiration, weak and rapid pulse, dizziness, fainting, and finally convulsions and death. In severe wounds these symptoms may in a few moments end fatally; at other times the train is prolonged for years, with a gradual sinking of the vital forces. Bleeding is not so well tolerated by children as by adults. In acute inflammations an amount of blood may be taken which would be seriously felt in a state of health. Bouilland and his disciples of the French school apply the lancet, cups, and leeches in a way that has deservedly excited the opposition of other practitioners; Liafranc, in a case of tetanus, bled a patient from the arm 19 days in succession, and applied nearly 800 leeches along the spine. The loss to the system from profuse



bleeding is very soon made up, and the sooner in proportion to the rapidity of the abstraction, in a healthy person; while the feebleness arising from frequent but inconsiderable hæmorrhages may require years for its removal. Modern practitioners generally avoid venesection except in inflammatory and congestive diseases of threatening character, as where the brain, heart, and lungs are in momentary danger; arterial sedatives (like digitalis and *veratrum viride*), and revulsives to the skin and mucous membranes, are fast taking the place of the lancet and the leech among educated physicians. While hæmorrhage from the uterus is peculiar to woman, and that from the stomach is most common in this sex, bleedings from the lungs, urinary organs, and rectum are most common in males; natural bleeders are almost always males. Bleeding from the nose is most frequent in the young, from the lungs between the time of puberty and adult age, and from the rectum, bladder, and uterus later in life. The prognosis of hæmorrhage varies according to its origin and amount, and the constitution of the individual; while an effusion of blood into the brain or the pericardium would be very dangerous, a bleeding from the nose or from piles would be generally of little importance; blood coming from the stomach and urinary organs is a graver symptom than that from the air passages; a rapid is more dangerous than a slow loss to the same amount, and a passive than an active hæmorrhage.—The treatment of hæmorrhage, exclusive of strictly surgical means, consists, in the active forms, of general and local depletion, digitalis and *veratrum viride* to quiet the circulation, purgatives, cold applications, lead lotions, rest, and elevated position of the bleeding part; in the passive forms, various astringents are used, such as dilute sulphuric acid, alum, tannin and its allies, ergot, &c.; in the natural bleeders, the hæmorrhage is usually treated by pressure, caustics, preparations of iron and nutritious diet to enrich the blood, sugar of lead and opium, and styptic applications, of which the best is a solution of the perchloride of iron. Arterial hæmorrhage may be known by the florid color, profuse quantity, and pulsating jet of the blood; nature's processes for arresting such a flow are the contraction of the divided orifice, the retraction of the vessel into its sheath, the coagulation of the blood in and about the sheath, and the retardation of the circulation by faintness; and these will generally suffice for the wound of an artery of the size of the temporal. When art interferes, it is by pressure, torsion, the ligature, cold, styptics, and caustics; a partial is more dangerous than a complete division of an artery, as contraction and retraction are prevented, and for this reason a small vessel should be completely divided. A lacerated artery contracts almost immediately, and rarely bleeds; hence the umbilical cord of animals bitten or torn by the mother gives forth no blood, and hence the efficacy of torsion. Agaric and spiders' web entangle the blood, and allow

it to coagulate; alum, turpentine, muriate of iron, creosote, nitrate of silver, &c., coagulate the blood and cause contraction of the vessels; the actual cautery, at a black heat, excites adhesive inflammation in the bleeding vessels, and is of great advantage when they are numerous, small, deep-seated, or diseased. Hæmorrhage from a vein is continuous and darker colored, and rarely dangerous, unless from a large, deep-seated, or varicose vessel; pressure, elevated position, and styptics will generally arrest it, and as a last resort the ligature. Bleeding from the nose may be either arterial or venous, and requires nothing special beyond snuffing up astringents and plugging the nostrils. Hæmorrhage from the urethra is treated by cold and pressure; that from the prostate, bladder, or kidneys (or *hematuria*), by internal astringents and tonics, the catheter, and cold injections. For hæmorrhage of the lungs and rectum, see HÆMOPHYYSIS, and HÆMORRHOIDS. Bleeding from the stomach is *hematemesis*, and that from the uterus *metrorrhagia*, or *menorrhagia* when connected with the menstrual discharge.—The famous Broochieri water for arresting hæmorrhage was composed of nearly equal parts of boiled turpentine and water; the *eau hémostatique* of Tisserand, with similar properties, consisted of the resin dragon's blood digested in turpentine. The solution of the perchloride of iron in water will very soon arrest any ordinary hæmorrhage, when it can be thoroughly applied to the bleeding surface.

HÆMORRHOIDS (Gr. *haima*, blood, and *rhoi*, to flow), or PILES, tumors situated near the anus, generally commencing by a varicose enlargement of the hæmorrhoidal veins of the rectum, and frequently complicated with, if not arising from, erectile tumors, blood-filled cysts in the submucous areolar tissues, and dilatation of the capillary vessels. By whatever caused, the mucous membrane becomes irritated, sensitive, disposed to bleed, thickened, and more or less obstructing the rectal canal. They have been divided into internal or external piles, according to their situation within the bowel or outside the anus; the former are generally within the last 8 inches of the rectum, of firm texture, varying in size from a pea to a walnut, pale when indolent, and dark red when congested or inflamed; the latter are found on the margin of the anus, of firmer texture, often covered half with skin and half with mucous membrane, and from their less disposition to bleed sometimes called blind piles. Hæmorrhoids are rarely single, generally spherical, with a large base, but occasionally pedunculate; their surface may be either smooth or irregular, rough, and ulcerated; when indolent and internal, they produce simply the inconvenience of bulk and consequent trouble in defecation; when irritated, either internal or external, they cause a sense of heat, tension, and itching, pain and straining during evacuation of the bowel, accompanied by more or less bleeding, frequent micturition, and weight and pain in the back and thighs;



when external, the friction of the clothes often renders standing, sitting, or walking exceedingly painful; when just on the verge of the anus, the act of defecation is accompanied by tenesmus and excruciating pain, rendered more intense by the usually present constipation; by constant efforts, the mucous membrane becomes prolapsed, adding another source of discomfort. Hemorrhoids, though generally a local disease, may be the channel by which a periodical flux or a constitutional plethora finds relief; in such cases the bleeding is preceded by the general and local symptoms of excess of blood. All ages and both sexes are subject to this disease, though it is comparatively rare before puberty, and females are more frequently sufferers from it than males, especially during gestation, and plethoric persons more than the anæmic. The predisposing causes are such as produce fullness of the hæmorrhoidal veins and impede the return of blood from them, such as sedentary habits, city life, constipation, pregnancy, the use of corsets, the weight of heavy garments suspended from the hips, and diseases of the thoracic and abdominal organs interfering with the circulation. The exciting causes are any thing which irritates the lower portion of the intestine, as the presence of pin worms, the use of aloëtic medicines and injections, the application of cold and moisture to the nates, riding on horseback or in hard carriages; in warm climates especially, the use of too nourishing food, with its tendency to produce plethora, and its accompanying luxurious habits, strongly predispose to hæmorrhoids; morbid or physiological suppression of the menses finds relief frequently and safely by the hæmorrhoidal flux; pregnancy, enlarged prostate, stone in the bladder, and pelvic tumors, act mechanically in producing hæmorrhoids. The prognosis is generally favorable, unless the disease be of long standing, in a debilitated constitution, or accompanied by malignant affection of the rectum; in some cases the hæmorrhoidal flux may be positively advantageous, and its sudden and complete suppression may subject the patient to more grave disease.—The general principles of treatment are, according to the evident causes, to diminish the amount of blood sent to the parts by active habits, abstemious living, avoidance of constipation, and attention to other hygienic rules. In case of irritation, leeches or cupping in the neighborhood, fomentations, poultices, enemata, refrigerant and soothing lotions, are of advantage. Strict observance of cleanliness, astringent applications like tannin ointment, pressure by bandage and pad, ice, and antiphlogistic measures, will suffice in many cases. When surgical interference is necessary, there is a choice between excision, ligatures, caustic, and the *écraseur* of M. Chassaignac; the operation is easily performed, the pain in the first and last of no account under etherization, and the hæmorrhage generally yields to the ordinary remedies.

HAFF (Dan. *Hav*, sea), a word used in connection with adjectives to designate a large

lagoon-like estuaries on the S. E. shore of the Baltic, communicating with it by one or more narrow passages. They are all in Prussia, and are called Ourisches Haff, Frisches Haff, and Stettiner or Pommersches Haff.

HAFFIZ, MOHAMMED, surnamed *SHAMS EDDIN* (son of religion), a Persian poet, born in Shiraz, near the beginning of the 14th century, died, according to the inscription on his tomb, in 1891. He early devoted himself to Mohammedan jurisprudence and theology, in which he became profoundly versed, and which he taught publicly. He then lived as a dervise, in luxurious pleasure, in the quarter of Shiraz called Mosella, under the dynasty of the Moesafirids, whose eulogist he was. The sultan Achmed Ilkani vainly invited him to his court at Bagdad. When in 1388 Tamerlane conquered Shiraz, he treated the poet with the greatest distinction. In his old age he abandoned luxury for austerities, and employed his talents in celebrating the unity of God and the praises of the prophet. This conversion did not secure him the pardon of zealous Mussulmans for his previous songs of love and wine, and they persisted in deeming him an infidel, an atheist, or a Christian, and after his death denied him the honors of sepulture. His admirers, however, maintained his orthodoxy, and, it being at length agreed to leave the decision to chance, the lot fell on a passage from his odes which avowed his faults, but at the same time affirmed that he was predestined to paradise. A magnificent tomb (described by Kämpfer in his *Amantates Exotica*) was then erected to his memory; it lies amid scenery described in his poems, and is still a favorite rendezvous of the young men of Shiraz, who resort thither to sing his verses and to drink wine. His only work is the *Diwan*, a collection of 571 detached odes, called gazels, and 7 elegies. His most licentious and passionate verses are regarded by the Persians as inspired by divine love, and are read as a devotional exercise by pious Mussulmans; and the principal oriental commentators occupy themselves with allegorizing and spiritualizing his expressions. A complete and wholly Persian edition was published at Calcutta in 1791; and the latest eastern editions are those of Bombay (1828 and 1850), and of Constantinople (1850), with the commentary of Sudi. Dr. Thomas Hyde, the first English orientalist who studied the poems of Haffiz, in 1767 translated into Latin his first gazel, with the Turkish commentary of Feridun. Others of them were translated into Latin by Rewinski and Sir William Jones. The whole *Diwan* was translated into German by Von Hammer (Tübingen, 1812), and several of the gazels into English by Richardson (1774), Nott (1787), and Hindley (1800).

HAGAR, an Egyptian servant belonging to Sarah, who, being childless, gave her to her husband Abraham, that by her, as a substitute, she might be blessed with children. Her descendants are called in the Bible Hagarites or Hagarenes, from herself, and Ishmaelites, from

her son Ishmael. The Arabs, who claim descent from her son, regard her with peculiar veneration, and speak of her as Abraham's lawful wife.

**HAGEN, FRIEDRICH HEINRICH VON DER**, a German literary historian and critic, born in Schmiedeberg, Brandenburg, in 1780, died in Berlin in 1856. He studied law at Halle, but soon devoted himself exclusively to literary criticism, officiated as professor of the German language and literature at Breslau and Berlin, and wrote extensively on the mediæval poetry of his country, publishing among others *Das Nibelungen-Lied*, *Das Narnenbuch*, *Lieder der älteren Edda*, *Nordische Heldenromane*, *Niederdeutsche Psalmen*, *Gottfried von Strasburg's Werke*, *Monumenta Mediæ ævi*, *Hundert altdeutsche Erzählungen*, &c.

**HAGENBACH, KARL RUDOLF**, a German ecclesiastical historian, born May 4, 1801, in Basel, where his father, Karl Friedrich Hagenbach (1771-1849), known by his *Flora Basiliensis*, was professor of anatomy and botany. He studied in Basel and in the universities of Bonn and Berlin, where he adopted the views of Schleiermacher. In 1828 he returned to his native city, where he was brought into relation with De Wette, whose memory he afterward celebrated in a *Gedächtnissrede* (1850). He is the author of *Encyklopädie und Methodologie der theologischen Wissenschaften* (Leipzig, 1833; 3d ed. 1861), of sermons, and of poetry. His principal works are: *Tabellarische Uebersicht der Dogmengeschichte* (Basel, 1828); *Vorlesungen über Wesen und Geschichte der Reformation* (Leipzig, 1834-'48; 2d ed. 1851); *Kirchengeschichte des 18. und 19. Jahrhunderts* (2d ed. 1848-'9); and *Lehrbuch der Dogmengeschichte* (2 vols., 1840-'41; 8d ed. 1852-'8). A 3d edition of an English translation of the last named work, under the title of "History of Doctrines," appeared in Edinburgh in 1858.

**HAGERSTOWN**, a city and the capital of Washington co., Md., on the W. bank of Antietam creek, 22 m. above its entrance into the Potomac, and 86 m. W. N. W. from Annapolis; pop. in 1850, 3,884. It has broad streets, is built mostly of stone and brick, and in 1850 contained 9 churches (2 African, 1 Episcopal, 1 German Reformed, 1 Lutheran, 2 Methodist, 1 Presbyterian, and 1 Roman Catholic), 7 newspaper offices, and 2 academies. It has a handsome court house which cost \$50,000, a town hall, an alms house, 2 banks, and a savings bank. There is a trade of some importance, but the industry is mainly agricultural.

**HAGGAI**, the 10th of the minor prophets, supposed to have been born at Babylon during the captivity, and to have come back from there with Zerubbabel. Nothing is known as to his death, though Epiphanius tells us he was buried at Jerusalem among the priests; if so, he must have been of the family of Aaron, though this is doubtful. The prophecy of Haggai is the 37th in order of the books of the Old Testament; it was delivered about 520 B. C., after the return of the Jews to their own land. It is

chiefly occupied with keen reproofs and affecting exhortations respecting the building of the 2d temple.

**HAGIOGRAPHIA** (Gr. *hagios*, sacred, and *graphein*, to write), or **HOLY WRITINGS** (in Hebrew, *Khetubim*, writings), the name given by the Jews to their 3d division of the Old Testament Scriptures. There are various suppositions concerning the earliest arrangement of this division by the Jews, founded on contradictory statements in Josephus, Philo, Jerome, the Talmud, &c., including a passage of Luke (xxiv. 44): "the things written in the law of Moses, in the prophets, and in the psalms." According to the arrangement now general among the Jews, the Hagiographa includes the Psalms, Proverbs, Job, the Song of Songs, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra, Nehemiah, and the Chronicles. These books probably received the name of "Hagiographa," or "Holy Writings," because, though not written by Moses or any of the prophets, strictly so called, they were nevertheless regarded as inspired.

**HAGUE, THE** (Dutch, 's *Gravenhage*; Fr. *La Haye*; Germ. *Der Haag*), the capital of Holland and of the province of South Holland, distant about 2 m. from the sea, 86½ m. by rail from Amsterdam, and 18½ m. from Rotterdam; pop. in 1859, about 77,000, ¼ of whom are Roman Catholics. It is the finest city in Holland; the streets are regular and spacious, and many of them are traversed by canals and lined with trees. The most beautiful quarter is the Voorhout, and the most fashionable the Vyverberg. It contains many stately houses, and among the public buildings are the royal palace; the palace of the prince of Orange; the *Binnenhof* or Inner Court, in which Barneveldt was beheaded, and which contains a magnificent Gothic hall; the state prison in which Cornelius de Witt was confined, and from which he and his brother John were dragged and torn to pieces by the populace; the town hall, 14 churches, an English chapel, 2 synagogues, and a fine theatre. The royal library contains about 100,000 vols., among which are the prayer books of Catharine de' Medici and Catharine of Aragon, and a Bible presented to William and Mary of England at their coronation; and among the MSS. is a copy of the treaty of Utrecht, the original of which is in the archives. In the same building is an extensive collection of medals and gems, including 800 mostly antique cameos, one of which is the apotheosis of Claudius, one of the largest known. Among the modern cameos is a fine portrait of Queen Elizabeth. The principal artistic attraction of the Hague is the picture gallery and museum, situated in the building called the Maurits Huis, from Prince Maurice of Nassau, by whom it was built. It contains some of the best works of the Dutch masters, as Paul Potter's "Young Bull," Rembrandt's "Surgeon," Vandyke's portrait of Simon, &c. The museum abounds with rarities from China and Japan, contains a large collection of Japan ware and Japanese weapons, and many

historical relics, including some of William III. of England, who was born in the Hague. John De Witt's house in the Kneuterdyk, and the house in which Barneveldt lived in the Lang Voorhurst, are historically interesting. The Hague possesses many educational, charitable, artistic, scientific, and religious institutions. Celebrated among the latter is the "Hague association" established in the latter part of the 18th century for the purpose of defending and propagating Calvinistic views of Christianity. There is a brass foundry in the Hague, but little trade and industry. On the outskirts of the city lies the country palace of the king, called the "House in the Wood" (*'t Huis in 't Bosch*), with a gallery of paintings and a fine park. Within a few miles of it is the watering place of Scheveningen, and the environs are dotted with elegant villas. —The city owes its origin to a hunting seat built by the count of Holland in the 13th century, and the name is traced to the enclosure (*hage* or hedge) which surrounded the count's (*graven*) park. In the 16th century it became the residence of the states-general, the stadtholder, and the foreign ambassadors; and many important treaties were concluded there in the beginning of the 18th century. But having neither corporation nor walls, and not returning any members to the states-general, it ranked as a village until after the accession of King Louis Bonaparte, who conferred upon it the privileges of a city. The revolution of 1795, however, and the removal of the principal departments of administration to Utrecht and Amsterdam, had a bad effect upon the fortunes of the Hague. The accession of the house of Orange to the throne of Holland in 1814 produced a favorable reaction, and since that time the city has been constantly increasing in prosperity, which is due mainly to the presence of the court, of the government and states-general, and of the foreign ministers.

HAGUE, WILLIAM, D.D., an American clergyman and author, born in New York about 1805. He was graduated at Hamilton college, Clinton, N. Y., in 1826, was ordained to the ministry, and has been pastor of Baptist churches in Providence, Boston, Newark, N. J., Albany, N. Y., and in his present station, New York city. Beside many occasional addresses and minor works, he has published the "Baptist Church Transplanted from the Old World to the New" (New York, 1846); "Christianity and Statesmanship" (1855); and "Home Life," a series of lectures on the duties and relations of the family circle (1855).

HAHN, AUGUST, a German theologian, born near Eisleben, March 27, 1792. He was educated at Eisleben, Leipsic, and Wittenberg, and in 1819 was appointed extraordinary professor of theology at Königsberg. There he quickly gained distinction for patristic and Syriac scholarship by his writings on Bardesanes, Marcion, and Ephraem. In 1827 he was called to the ordinary professorship of theology at Leipsic, and indicated his dogmatic tendency in his treatise *De Rationalismi, qui dicitur Vera Indole,*

*et qua cum Naturalismo continuatur Ratione* (Leipsic, 1827). He regarded a supernatural revelation as the necessary foundation of religion, maintaining that man could have by nature no certain and complete knowledge of religious truths. At the same time he accepted many of the results of recent criticism and exegesis, by which he modified the principal Christian dogmas. In his treatise entitled *Offae Erklärung an die evangelische Kirche zunächst in Sachsen und Preussen* (1827) he maintained that the rationalists ought in conscience voluntarily to leave the evangelical church. In 1838 he was called as consistorial councillor and ordinary professor to Breslau, and in 1844 the office of general superintendent for Silesia was conferred upon him. Among the writings which have made him a leading representative of the new supernatural and evangelical theology are: *Lehrbuch des Christlichen Glaubens* (1828); *Sendeschreiben an Bretschneider über die Lage des Christenthums in unserer Zeit und das Verhältniss Christlicher Theologie zur Wissenschaft überhaupt* (1832); *Das Bekenntnis der evangelischen Kirche* (1847); *Das Bekenntnis der evangelischen Kirche in seinem Verhältnisse zu dem der Römischen und Griechischen* (1853); and *Commentatio de Suppositionis Natura ex Sententia Patrum Ecclesie Priscæ*.

HAHN, PHILIPP MATTHEUS, a German mechanician, born near Stuttgart, Nov. 25, 1739, died May 2, 1790. Although by profession a clergyman, a large portion of his life was devoted to the study of mechanics and mathematics. While a young man he experimented on a machine for determining longitude at sea, and a carriage to be moved by steam, but wanted means to carry out his designs. Among his most ingenious inventions were an astronomical orrery and a calculating machine, both of which gained him great reputation in Germany. He is the author of a number of works, scientific and theological.

HAHN-HAHN, IDA MARIE LUISE SOPHIE FRIEDERIKE GUSTAVE, countess, a German authoress, born in Tressow, Mecklenburg-Schwerin, June 22, 1805. Her father, Count Karl Friedrich von Hahn-Neuhans (born 1782), was a theatrical enthusiast, who, after devoting his whole life and fortune to the stage, was compelled in his old age to support himself by managing a provincial company, and died in poverty at Altona, May 21, 1857. At the age of 21 she was married to her cousin, the wealthy Count Friedrich Wilhelm Adolf von Hahn-Hahn, from whom an incompatibility of temperament induced her in 1829 to procure a divorce. She sought relief under her disappointments in literature, and between the years 1835 and 1837 published 3 volumes of verse. These were followed by a series of novels, giving pictures of aristocratic German life, thoroughly national in character, but more or less tinged by her peculiar individuality. Some of the most popular, such as "The Countess Faustina," "Ulrich," "Sigismund Forster" and "Cecil," have

been translated into English. In the intervals of their publication she travelled extensively over Europe, and her experiences of the different countries she visited have been given in as many volumes. In 1839 she submitted to a dangerous operation on the eye, which for a time threatened to deprive her of sight; and to divert her mind she pursued her restless wanderings to the East, recording her adventures in the "Oriental Letters." Her mental temperament, early disappointments, and intellectual longings, contributed to render her life unhappy. In 1848 the death of an intimate friend oppressed her with a gloom which she sought to dispel by religious reading. Two years later she embraced the Roman Catholic faith, giving in one of her latest prose works, "From Babylon to Jerusalem," an account of her conversion. Finally in 1852, wearied with the world, she entered the mother house of the order of the Good Shepherd, at Angers. She has since devoted her life to the reformation of the outcasts of her own sex, and has published some religious poems.

HAHNEMANN, SAMUEL CHRISTIAN FRIEDRICH, the founder of the homœopathic system of medicine, born in Meissen, Saxony, April 10, 1755, died in Paris, July 2, 1848. His father, a painter on porcelain, and a man of considerable acquirements, was his first instructor, but was prevented by poverty from giving him any better education than the elementary schools of his native place could afford. Young Hahnemann, however, evinced so much industry and intelligence that he was admitted free of expense into the high school of Meissen, whence, after a thorough instruction in Latin, Greek, and the chief modern languages, he repaired at the age of 20 to the university of Leipsic for the purpose of studying medicine. His means of subsistence having failed him, he devoted his leisure hours to teaching the languages, and to translating foreign medical authors into German. So energetic was his disposition, and so hardy his natural constitution, that, for the purpose of pursuing his literary labors, he was accustomed to sleep only every other night, a habit he persevered in for several years. The professors of the university, observing his zeal, gave him free access to their lectures. In 1777 he went to complete his studies at Vienna, where he came under the notice of Quarin, physician to the emperor, and chief physician to the hospital of Leopoldstadt, who intrusted him with the care of one of the hospital wards, and subsequently recommended him to Baron von Brückenthal, the governor of Transylvania, in whose family at Hermannstadt he remained as librarian and physician for nearly 2 years. In Aug. 1779, he took his degree of M.D. at Erlangen, presenting for the occasion his thesis entitled *Conspectus Affectuum Spasmodicorum Ætiologici et Therapeutici*. After a brief residence in Hettstädt and Dessau, where he studied chemistry and mineralogy, and at Gommern near Magdeburg, where in 1785 he

was married, he settled in 1787 in Dresden, and soon secured a lucrative practice. He was fast achieving a reputation there, not only as a hospital physician and a general practitioner, but as a writer on medical science, when a distrust of the received system of therapeutics caused him to pause in his labors. In place of facts and laws, he complained that he found only hypotheses and theories, and to doubt succeeded complete discouragement. Finding that he could no longer conscientiously practise his profession, he returned in 1789 to Leipsic, where he resumed his chemical studies, and endeavored to support his family by translating English and French medical authors. At first he was obliged to struggle with poverty, and to endure the reproaches of his wife and children, who could not appreciate his motives in exchanging a lucrative profession for one so precarious. To add to his troubles, his children experienced severe attacks of illness, and he was obliged to minister to their relief according to a system in which he had ceased to place confidence. This circumstance, however, only stimulated his desire to establish a new system of therapeutics, the leading principle of which soon occurred to him. In 1790, while engaged upon a translation of Cullen's "Materia Medica," he was struck with the contradictory properties ascribed to Peruvian bark, and the various explanations given of its operation in intermittent fever. Dissatisfied with the latter, he resolved to try upon himself the effects of the medicine, and, after several powerful doses, discovered symptoms analogous to those of intermittent fever. The fact that a drug had produced upon a man in health the very symptoms which it was required to cure in a sick man immediately suggested to him the great law, *Similia similibus curantur* ("Like cures like"), which is the groundwork of the homœopathic system. He nevertheless determined to test the principle fully before announcing it to the world, and did not hesitate to reduce his constitution to a permanent state of ailment, often at great personal risk, by experimenting upon himself with a variety of drugs. Similar results having been obtained in every instance, and also in the experiments tried upon his friends and children, he applied the new law to the treatment of the patients in the insane asylum at Georgenthal near Gotha, over which the duke of Saxe-Coburg-Gotha had appointed him, with complete success. From Georgenthal he proceeded in succession to Pymont, Brunswick, and Königsutter, effecting in each place remarkable cures. In 1796 he ventured, in a paper published in Hufeland's "Journal," to make his first public exposition of the *similia similibus* principle, which, if not its discoverer, he was the first to declare to be the leading principle in therapeutics. His suggestions were received with indifference or ridicule, and during the next 15 years, in the course of which he visited alternately Hamburg, Eilenburg, Wittenberg, Torgau, and finally Leipsic, he was the object of ceaseless attacks from those

whose interests were opposed to the innovations he sought to introduce into medical practice, the physicians and apothecaries in particular making war upon him without mercy. During this period he published a treatise on the efficacy of belladonna in the prevention and cure of scarlet fever, followed by *Fragmenta de Viribus Medicamentorum Positivis sive Obvis in Corpore Sano* (2 vols. 8vo., Leipzig, 1806), and "Medicine of Experience" (8vo., Berlin, 1806), all treating of the new doctrine. But in his "Organon of Rational Medicine" (8vo., Dresden, 1810), homœopathy first received its distinctive name, and was first reduced to a system and methodically illustrated. This work, of which many editions and translations in the principal European languages have since appeared, created a considerable sensation in Germany, and a bitter warfare was waged for upward of 12 years between the old and the new schools of therapeutics. About this time he fixed his residence in Leipzig, where, notwithstanding much opposition, he entered upon an extensive practice, and gathered about him many friends and disciples. During the prevalence of a malignant form of typhus in 1818, caused by the recent presence of the allied and French armies, the patients became so numerous that it was necessary to divide them among the physicians of the city. Of the 78 allotted to Hahnemann, and by him treated on the homœopathic method, all recovered except one old man. But this fact only increased the enmity of his opponents; and by a combination among the apothecaries, who reviled against him an old law which prohibited a physician from dispensing his own medicines, a practice Hahnemann had always followed, and which, on account of the interested motives of his adversaries, he was unwilling to relinquish, he was induced in 1820 to accept an asylum in Köthen, in the dominions of the duke of Anhalt. Leipzig subsequently repaired this injury by erecting a statue to him in one of the city squares. He encountered at Köthen the same hostility which had driven him from Leipzig, and such were the annoyances and insults heaped upon him that he rarely went abroad. The homœopathic system was meanwhile making its way silently over Europe, and patients, many of whom were persons of distinction, repaired from all sides to receive the advice of its founder. The importance which the petty town of Köthen thus acquired soon caused a reaction in his favor, and when, upon his marriage for a second time in 1835 with Mlle. d'Hervilly, a young French woman, and an enthusiastic admirer of his, he took his departure, it was deemed necessary to go secretly by night for fear the populace might insist upon detaining him. Repairing with his wife to Paris, he resided there in the active practice of his profession until his death, and had the gratification of hearing that a professorship of homœopathy was to be established at the university of Vienna, and that homœopathic hospitals were proposed in London, in Berlin, and many

German cities. In addition to the works previously mentioned, he published *Materia Medica Pura* (6 vols. 8vo., Dresden, 1811-'31); "Chronic Diseases, their Peculiar Nature and Homœopathic Cure" (4 vols. 8vo., Dresden, 1828-'30); pamphlets on *Mercurius Solubilis*, the method of detecting adulteration in wine, &c.; a number of minor medical works which first appeared in a collected form in 1829 (2 vols. 8vo., Leipzig); and many volumes of translations of English and French medical and miscellaneous works. Several of his most important works have been translated into English and published in New York by Prof. O. J. Hempel of Philadelphia. (See HOMŒOPATHY.)

HAIL, the watery vapors of the atmosphere congealed in icy masses called hailstones, and precipitated upon the earth. The phenomenon is not, like rain falling in frozen drops, and like snow, dependent upon coldness in the lower strata of the atmosphere; but it most frequently appears in the spring and summer months, and in the warmest part of the day, rarely at night. It is, moreover, usually accompanied by violent commotions in the atmosphere, vivid lightnings and heavy thunder, and clouds of intense blackness, phenomena that attend the coming together of bodies of air of different temperatures. As the storm gathers, rain often falls for a short time, and then suddenly changes to hail. The clouds from which the hailstones are precipitated are of a reddish bronze, sometimes of sea-green color, apparently not very high, of very irregular outline, as well upon their edges as upon their lower surface. For some minutes the hailstones rattle down with great violence, rebounding from the earth and rapidly covering it with icy balls, sometimes to the depth of several inches. The storm then suddenly lulls for a short time, and soon sets in again with rain or snow, the temperature having considerably fallen. The size of the hailstones is generally from  $\frac{1}{4}$  of an inch to an inch in diameter; but many authentic cases are cited of hailstones of 8 inches diameter, and some of 4 inches; and a few cases are on record, which cannot well be questioned, of stones much larger than these. Thus the abbé Maury, in a paper read before the royal society in 1798, speaks of their falling in Germany from  $\frac{1}{4}$  inch in diameter to the weight of 8 lbs. Matteucci, describing the storm of July 24, 1832, at Tussé, certifies positively to their having fallen of the weight of 1  $\frac{1}{4}$  lbs., and states that it appears certain that one was found which weighed 14 lbs., and that another forced its way through the roof of a house. But the statement of Heyne in his historical and statistical tracts on India, when speaking of the masses of hailstones that have fallen in the Mysore country, that "in the latter part of Tipoo Sultan's reign it is on record and well authenticated that a piece fell near Seringapatam of the size of an elephant," must be received with some allowance for oriental exaggeration. The devastation caused by hailstones is at

times very serious. Sir Robert Wilson describes a terrible thunder and hail storm which occurred at Marmorice bay, Asia Minor, while the British fleet were at anchor there in Feb. 1801. It continued at intervals two days and nights. The hailstones, as large as walnuts, fell in showers, pouring down from the mountains, and deluging the camps with a torrent of them two feet deep. In France, a country peculiarly subject to the most violent hail storms, a district comprising 1,000 parishes has been ravaged by a single storm, and damage has been caused to the amount of \$5,000,000, as was the case in 1788. Arago states that in 1847 the crops in two small agricultural districts in Burgundy were injured by hail to the amount of 1,500,000 francs. Instances are recorded of domestic and wild animals being destroyed in large numbers by the hailstones. A little after midnight of March 28, 1884, in a hail storm which continued only 10 minutes, at Jackson, La., great numbers of cattle were killed by the hailstones, and much damage was done to the houses and woods. Darwin makes mention of many wild deer being killed in a hail storm at night in Buenos Ayres, one man finding and bringing in 18 carcasses, and another 7. Ostriches and other birds also were destroyed. The velocity of the fall of hailstones is usually much less than should be due to bodies of their density, which is somewhat less than that of water falling from altitudes of several thousand feet; and several ingenious theories have been devised to account for this—as the resistance occasioned by upward currents of air, such as perhaps always accompany the phenomenon. Prof. Olmsted, in his paper upon the phenomena and causes of hailstones, in vol. xviii. of the "American Journal of Science" (1880), supposes that the true reason of the small velocity is the retardation occasioned by the nucleus continually taking up in its descent accessions of vapor, which are in a state of rest. But in a hail storm in India described by Dr. A. T. Christie in the "New Edinburgh Philosophical Journal," and cited by Prof. Olmsted in vol. xx. of the "American Journal," p. 374, it is stated that the heavy clouds appeared almost to touch the tops of the tents; whence it would seem that the stones do not necessarily require a great elevation for their production. Their descent, however, is by no means always unaccountably slow. Dr. Malcolmson describes another storm which occurred in India in 1831, when the stones "ploughed up a gravel walk like musket balls, and passed through glass windows, making round holes, but not cracking them." These hailstones are described as flat; more commonly they are spheroidal, sometimes pointed, and sometimes ragged. When broken open, they generally present an outer homogeneous coating of opaque ice, or a succession of opaque and transparent layers of ice, enclosing a central nucleus of spongy but somewhat hardened snow. They have also been seen of radiated structure. Hail storms are of more

frequent occurrence in the temperate than in tropical climates, and in the polar regions they are scarcely ever heard of. Some countries are particularly subject to them; none more so perhaps than the south of France, where in 1829 an insurance company was organized to protect against their ravages. In that country the practice was introduced in the last century, and has since been extended into Germany, Switzerland, and Italy, of setting up in the vineyards long pointed poles or hail rods (*para-grêles*), with the view of thereby drawing off the electricity which is developed in the hail clouds, and thus disarming the cloud, on the supposition that the hail was, like the lightning, a result of its electrical condition. This was originally a hypothesis of Volta, who explained the origin of hail by the snowy nucleus being alternately attracted and consequently passed between two clouds charged with opposite kinds of electricity, and gradually accumulating more moisture and bulk. The theory has found little favor with scientific men, but the *para-grêles* have been used with great confidence in their affording valuable security; and in 1847, when an application was made to Arago to recommend some means of protection against the hail storm, he proposed the use of balloons communicating with the earth by a metallic wire in order to discharge the electricity of the clouds, as if this were the cause, and not merely a concomitant, of the production of hail.—It appears that countries may vary at different periods in the conditions favorable or opposed to the occurrence of hail. Thus at Havana, as stated by Humboldt, and confirmed by the records of the date of his observations, hail fell only once in 15 or 20 years. M. Poey of that city, in a paper presented to the American association in 1854, stated that from 1828 to 1846 no hail fell there, but every year afterward excepting 1850, and including 1854, it was observed; and the maximum fall of hail in the island, it was remarked, did not occur in the hottest months, but in March and April. Hail storms are generally limited to a district of moderate area, though they often extend many times as far in length as in breadth. The memorable storm of July, 1788, passed over France in two parallel lines from S. W. to N. E.; one line extended about 500 miles in length, and the other about 600 miles; the mean breadth of each was only about 9 miles, and the interval between them, in which the rain fell in torrents, was 15 miles. The same cloud has been observed to shed rain in one portion, while hail was falling from another part of it.—The cause of hail storms is assigned by Prof. Olmsted, in the paper already noticed, to "the congelation of the watery vapor of a body of warm and humid air, by its suddenly mixing with an exceedingly cold wind in the higher regions of the atmosphere." If a current of air in the upper regions of the atmosphere and in high northern latitudes were moving in a southerly direction, it might carry with it over many degrees of latitude its low tem-

perature, while another from the south might convey in the opposite direction the heat and moisture it acquired in the tropics. Should these meet, similar phenomena to those exhibited by hail storms might well be expected to occur—a rush of opposite and violent winds, the formation of dense clouds and the condensation and precipitation of their moisture, violent electrical excitement with terrific discharges of thunder and lightning, and soon after a great reduction of temperature upon the surface by the descending of the cold air of the upper current. The extremely low temperature of this current would cause the congelation as well as condensation of the watery vapor, and the particles of snow forming intensely cold nuclei would, as they fell, condense more moisture, which, instantly becoming solidified upon their surface, would add continually new layers of ice to their bulk. Currents of air of very different temperatures are more likely to come together in the temperate zones than in the torrid or the frigid zones; and it is in the first named, as already observed, that hail storms are most frequent. The conditions are favorable for their occurrence in the tropics in the vicinity of high mountains, and hail storms are more commonly encountered there in such situations. Southern France, so peculiarly exposed to them, is a hot and humid region situated between the Alps and the Pyrénées, the sources of the cold blasts. Mr. William C. Redfield advocated the opinion that the hot and cold airs are intermingled by a vortex or whirlwind in the atmosphere, or spout as it is sometimes called, connecting above with an overlying stratum of unusually cold air. A portion of this probably descends outside the vortex, and near the surface of the earth is pressed in and interlaminated with the layers of warm and moist air drawn in together with it. The moisture condensed by the chilly airs congeals in drops, which are whirled around in the vortex and swept upward, passing through layers of various degrees of temperature, and receiving in some of them accessions of moisture, which are converted in the coldest into successive icy coatings. Reaching the upper stratum, the low temperature they there encounter prepares them to receive new accessions in their fall to the earth. In the tropics it is rarely the case that a stratum of sufficiently low temperature to produce hail comes so near the lowest layers that a vorticular communication can be established between them, and hence the rarity of hail storms in these regions.

HAILES, LORD. See DALRYMPLE, SIR DAVID.

HAI-NAN, a large island of China, lying S. of the province of Quang-tung, of which it forms part; pop. estimated at 1,500,000. It is separated from the continent by a channel 15 m. broad, and difficult of navigation even for junks. It is situated between lat. 18° 10' and 20° N., and long. 108° 20' and 111° E.; length 185 m., breadth 90 m. The E. coast is steep and rocky; the N. W. coast is unapproachable because of

sand banks; but the S. coast is indented with several commodious and safe harbors. The interior of the island is mountainous and barren, but the low lands near the sea are fertile and well cultivated. The principal productions are rice, sweet potatoes, sugar, tobacco, fruits, medicinal plants, sandal wood, brazilletto, ebony, dye woods, and wax. There are valuable fisheries off the coast. The inhabitants of the maritime districts are mostly the descendants of Chinese settlers, but the interior is occupied by a distinct race, who claim to be independent of the Chinese government, and are supposed to be aborigines. These people are described as cheerful, amiable, cleanly, and industrious. Hai-nan is divided into 13 districts, whose respective capitals are all on the coast, and some of which are said to contain from 80,000 to 90,000 inhabitants. The metropolis of the whole island is Kiang-chow-foo, the port of which was opened to European shipping by the treaty of Tien-tsin (Aug. 1858).

HAINAUT, or HAINAULT (Flem. *Hennegouwen*; Germ. *Hennegau*), a province of the kingdom of Belgium, bounded N. by West and East Flanders and Brabant, E. by Namur, and S. and W. by France; area, 1,435 sq. m.; pop. in 1856, 769,841. It is traversed by the rivers Sambre, Scheldt, Dender, Haine, from which the province received its name, and by several canals. It is very hilly in the S. E., but in other parts generally level. The soil, except in the arrondissement of Charleroi, is fertile. The mineral productions are coal, iron, lead, slates, marble, building stones, and limestone. The chief crops are wheat, barley, oats, rye, flax, beans, hemp, hops, potatoes, tobacco, and chicory. Horned cattle, sheep, and horses are reared—the latter valued as draught animals. There is also abundance of poultry, game, and bees. The inhabitants generally follow agriculture and cattle rearing, but they manufacture hardware, glass, woollen and linen goods, porcelain, pottery, bricks, lace, and Brussels carpets. The principal exports are coal, iron, and lime. The province is traversed by good roads and railroads, the great lines being the Brussels and Namur and the Brussels and Valenciennes, beside several branch railroads. The chief towns are Mons, the capital, Tournay, Ath, Soignies, Charleroi, and Thuin. Hainaut was ruled by the counts of Hainaut in the 9th and 10th centuries, and subsequently attached in turns to the dominions of the counts of Flanders, the dukes of Burgundy, and the house of Hapsburg; since which time it has shared the fate of the other Belgic provinces.

HAIR, an elongated, more or less cylindrical epidermic appendage, analogous to the feathers of birds and the scales of reptiles. Its essential structure consists of an assemblage of epidermic cells at the bottom of a flask-shaped follicle in the substance of the skin, supplied with blood by vessels distributed to its walls; it is made up of a root, from which the hair is developed, and a stem or shaft continuous with it. The root

hibits a bulbous enlargement, which, with the lower part of the stem, is enclosed in an invagination of the epidermis, having an outer or cellular and an inner or fibrous layer, formed of granular cells; each hair follicle is implanted in a depression in the dermis, between whose epidermic lining and the stem is a space into which the canals of sebaceous follicles frequently open, and in which entozoa are often developed; the inspissated sebaceous secretion forms the scurf at the roots of the hair; the follicle penetrates sometimes  $\frac{1}{2}$  of an inch, reaching in the head, face, and pubis the subcutaneous areolar tissue, but generally is imbedded in the substance of the true skin. The bottom of the follicle is occupied by a papilla upon which the hair rests, a compound cellular vesicle, the true germ of the hair. The stem is composed of a cortical investing horny layer of scales, arranged in an imbricated manner, a softer medullary or pith-like substance in the centre, and a fibrous intermediate portion constituting  $\frac{1}{3}$  of the bulk of the hair; the last two are by Carpenter considered as forming together the medullary substance. The growth of hair takes place at the root by the development of new cells at the bulb, the old being pressed forward by the new or becoming elongated in the stem. Hairs are very rarely cylindrical, but generally elliptical and flattened in proportion to the curl or crispness; the size is greatest toward the lower third, the root being smaller and the end terminating in a point. The hairs of the head are the longest, those of the beard the thickest, and those of the general surface the finest; among women the hair has been known long enough to fall below the feet, and the beard of man occasionally reaches to the waist; frequent cutting and shaving of hairs increase their thickness, but not necessarily their number. Hairs are observed in the fetus as early as the 3d or 4th month, in the order of follicle, bulb, and hair; from the resemblance of the mucous membranes to the skin, it is not surprising that hairs are sometimes developed on the conjunctiva of the eye, in the intestines, ovaries, &c.; they are frequently found in encysted tumors and in other inversions of epidermic structure. Hairs may be transplanted, and will contract organic adhesion in the new tissues; according to Eble, a hair which has reached its full development becomes contracted just above the bulb and falls off. In vigorous health the hairs are thick and firmly set in the skin; in debilitated persons they fall out spontaneously or with very slight force; in the latter case the bulb generally alone comes away, the sheath and germ remaining behind, and capable of reproducing the hairs under proper treatment or favorable circumstances; even when the entire follicles are removed, it is possible that new ones with their germs may be formed; new shafts are constantly in process of formation, as is shown by the short and pointed hairs on the scalp of old persons. The nutrition of hairs is effected through vessels in close contact with their tissue, with-

out entering into their structure; so that causes affecting the general health, and especially the condition of the skin, act powerfully upon the nutrition of the hair; the premature baldness and grayness of the Americans as a people is in great measure owing to the non-observance of hygienic rules, and to excess of mental and physical labor in a climate foreign to the race. Hairs are distributed over the entire surface of the human body except the palms, soles, and terminal joints of the fingers and toes; but for special purposes most abundantly on the scalp, brows, edge of the lids, pubis, chin, cheeks, armpits, chest, and entrance of the nose and ears. In these situations the number varies according to temperament, age, health, and sex. According to Withof, the quarter of a square inch contained 293 hairs on the head, 89 on the chin, 28 on the forearm, 19 on the back of the hand, and 18 on the front of the thigh; in the same extent he counted 147 black, 162 brown, and 182 flaxen hairs, showing the comparative fineness. Long and strong hairs are often found growing from moles and naevi in various parts of the body. The hair generally grows in an oblique direction on account of the way in which the follicles are placed; these are sometimes placed wrongly on the scalp, causing much trouble to anxious mothers in regard to this head ornament in their children; perseverance will generally bring the refractory locks into the desired direction. From contraction or corrugation of the skin from cold, fear, or other causes, the hair, especially on the head, becomes partially erect, though it can never stand on end "like quills upon the fretful porcupine." The color of the hair depends partly on the presence of pigment granules, and partly on the existence of numerous minute air spaces which cause it to appear dark by transmitted light; its intensity generally bears a close relation to the color of the iris and the skin; in albinos and in gray-haired persons the coloring matter is deficient or absent. Long contact with chlorine decolorizes hair; and the undoubted fact that hair may turn white in a short time under the influence of strong emotions is doubtless to be explained by some chemical action upon the oily coloring matter, as suggested by Dr. D. F. Weinland, and more fully explained in the article FEATHERS. The turning gray of the hair is no sign of its loss of vitality, as hair of this color often grows for years as vigorously as the darker hued. Hair is remarkable for strength, elasticity, and durability, the first depending on its fibrous structure and the last two on its horny nature; a single hair will bear a strain of 1,150 grains, and might sustain the sword of Damocles. Hairs will endure not only during a long life, but will grow after death, and last for centuries; it is well known that hairs, especially of cats and other animals, become electrical by rubbing; the hygroscopic property of hair has been painfully manifested to many a beau and belle whose rebellious locks have refused to retain their ar-



tistic curl on the sudden occurrence of a moist atmosphere. Nitrate of silver blackens hair, forming a sulphuret, and this substance and sulphur form the bases of most of the popular hair dyes. When burned, hair emits a disagreeable odor as of burning horn. The uses of hair are manifest; on the head of man it is one of his chief ornaments, as well as a protection from injury; on the face it gives a character and dignity, which the close-shaven moderns are beginning to appreciate; on the brows and lids, and at the entrance of the nose and ears, it prevents the contact and entrance of foreign bodies; and, even in man, the general covering of hairs doubtless contributes to the warmth and proper electric condition of the skin; the object of the hair in animals is obvious to every one. The two essential parts of cortex and medulla are found in the hairs of all animals, however much they may differ in appearance; in the cats, seals, and other animals, the whiskers are supplied with large nerves, and become exquisite organs of touch; in the soft hair of the sable there is very little fibrous portion; in the musk and reindeer the entire substance seems to be composed of delicate polygonal cells; in the smaller rodents the cortical tubular portion is crossed by transverse partitions, partial or complete; in the bats the projections of the cortical scales are often arranged in whorls around the stem; in the peccary the cortical substance sends inward radiating processes whose interspaces are filled with the medullary portion, and this is essentially the structure of the quills of the porcupine, which, as Shakespeare has hinted, are only modified hairs; even the horn of the rhinoceros is only an assemblage of compact hairs, and does not differ in its essential structure from the finest wool. In proportion to the prominence of the imbricated scales will the hair of animals have the property of becoming felted.—In most nations the adornment of the hair has always formed one of the principal duties of the toilet, and the caprices of different races and epochs in this respect are very remarkable. While the Greeks considered long hair a beautiful object, the Egyptians, regarding it as an incumbrance, removed it and substituted light wigs. The Hebrew women rejoiced in long tresses, and adorned them with gold, silver, and precious stones; and no doubt the locks of the effeminate Absalom were the envy of his time. The Roman ladies used artificial hair, dyed their own, sprinkled it with gold dust, and represented it in various fanciful devices. So desirable was a fine head of hair considered, that it became sacred, and was often dedicated to the gods on important occasions of marriage, victory, escape from danger and death, and burial of friends; plucking it out or neglecting it was a token of affliction. Remains of this feeling are manifested in modern times by punishing various offences by cutting the hair, by mortifying the pride as in the tonsure of the priests and the cropping of the laity, and by the marking of the slave by the shortness of the hair.

In the time of Francis I. short hair became the fashion, and under Louis XIII. long hair, curls and wigs; then came the reign of hair powder, periwigs, and perukes of monstrous size, which were banished by the French revolution, since which civilized nations have been content with natural heads of hair.—Some persons are born without hair on any part of the body; on the head it falls off after many febrile diseases, especially typhoid fever, and after erythematous affections of the scalp and irritating applications; the present fashion of tightly fitting and unyielding hats no doubt contributes largely toward the premature fall and grayness of the hair. The bulbs are often diseased, and in *plica Polonica* the hair, generally insensible, becomes exceedingly sensitive at the roots and liable to bleed. For the various diseases of the hair tonic and stimulating applications are sometimes beneficial; when the hair is thin and falls out easily, shaving the scalp will generally produce a thicker, firmer, and darker colored growth. For diseases of the hair depending on parasites, see *EPIDPHYTES*, and *ERIZOA*.—Microscopic examination shows that the hair of the negro is not wool, though differing considerably in form from that of Europeans; the form is not connected with the color, for the black hair of the former is not like the equally black hair of the latter; the hair of the albino negro, "whether red or flaxen, is as knotty, as wiry, and as woolly as that of his sable parents" (Van Amringe); the differences in the form of the hair, being permanent, are considered by some as of the same specific value as those of the fur, feathers, and scales of lower animals. Straight hair approximates to the cylindrical form, but the curled or crisp varieties are flattened; the negro hair has the deepest longitudinal groove, and a transverse section like that of a bean, and its peculiar twist is said to be due to a greater tension of the fibres along this groove; the closely matted hair of the Bushman is very flat and ribbon-like, 4 or 5 times broader than thick. Mr. P. A. Brown of Philadelphia has attempted to classify "mankind by the hair and wool of their heads;" according to his observations, hair is more complex in structure than wool, having few rough and imbricated scales, while wool has many; hence the hair of the white races will not felt; that of the negro will, and in this respect comes near to true wool. Climate changes in animals the relative proportion between hair and wool, both of which are found in most land mammals, but does not change the one into the other; the hair would predominate in warm climates, and the wool in cold, explaining the apparent anomaly of some individuals of a species bearing wool while others are covered with hair; a similar coexistence of hair and wool has not been found in man.—Many insects are provided with hairs, both in the larval and perfect states, which afford beautiful microscopic objects, from their branches, tufts, spines, and protuberances. The cuticle of plants is often beset with hairs,

nade up of a linear series of elongated cells, attached end to end; they sometimes have granular bodies connected with them, as those which secrete the viscidty on the leaf of the sundew (*Drosera*), or the irritating liquid of the nettle. In the invertebrates and in plants there are many evident connecting links between hairs and scales; vegetable hairs generally exhibit the phenomena of rotating fluids, or circulation of currents.

**HAIR MANUFACTURES.** The different kinds of hair serve a variety of useful purposes, some of which have been already noticed, as in the articles *BURSTLES*, and *BAUSH*. The short hair of cattle is an ingredient in mortar, binding the earthy particles together. The long hair of the tails of horses and of cattle is largely employed as the woof of the fabric known as hair cloth, the warp of which is a black yarn, of linen, cotton, or worsted. It is also used for sieves, for strings for fiddle bows, and for fishing lines; and the short qualities, prepared by the process called curling, are the best material for stuffing mattresses, sofas, and other seats. Human hair is an article of trade for the use of perrequiers, and in some countries, as France, Belgium, and Germany, traders in it visit the same districts annually, buying the hair of the peasant girls, who allow it to be clipped for a trifling amount, sometimes a few trinkets, ribbons, or handkerchiefs, of the value of 11 or 12 English shillings. The quantity obtained from each one rarely exceeds a pound weight. A Dutch company engaged in this business visit England annually for orders, and in the last century they found a ready market for the light hair so common in their country. For that of a golden tint they were accustomed to receive 8 shillings an ounce, twice its weight of silver. The traders acquire a singular skill in detecting the hair of different countries or even districts by its smell and other indications quite insensible to the uninitiated. Black hair is obtained chiefly from Brittany, and to the amount of 200,000 lbs. annually. The quantity of all kinds imported into London is estimated at not less than 5 tons a year. Beside its use for the head, it has of late years been employed as a material for delicate articles of jewelry, being plaited into suitable forms for ornamental pins, ear rings, &c. By the early Egyptians the use of wigs was regarded as a more cleanly practice than wearing the natural hair. Artificial hair was also worn by the Greeks, Assyrians, Persians, and Romans, and with the last named the blond hair of the Germans appears to have been in high esteem.—Horse and other hair used for weaving into cloth is collected at the factories from various sources, much of it being imported from South America. It is assorted for manufacturing according to its qualities and length; the long white is reserved for fiddle bows and for spinning, or to be dyed with bright colors; and the long black and gray is dyed black for weaving into cloth. The short hairs are curled for stuffing cushions, &c.; and medium lengths are

kept for weaving into coarse fabrics, as horse hair gloves, filtering bags, &c. For weaving into ordinary hair cloth, the long black hairs are further assorted in bunches of uniform lengths by hackling and carding. They are kept flexible and ready for use in a vessel of water, and are furnished to the weaver one at a time by a child upon the opposite side of the loom, who throws the hair over the hook of the shuttle, and the weaver draws it through to the other side, when the batten is driven home twice. The warp threads are then shifted by the treadles, and a new shuttle way is opened for the next thread of the woof. Each of these threads is thus formed of a distinct hair, and the width of the fabric is limited by the least length of the hairs. This is sometimes, but rarely, 40 inches; for such width much time is required to select enough of the long hairs. The warp is dressed with paste in the usual way. The fabric is finally hot-calendered to give it lustre. Horse hairs may be bleached nearly white, and they are dyed of various colors. The western Indians dye them of a bright scarlet, and use them in tufts together with gaudy colored feathers for ornamental purposes.—The short hairs are prepared by first carding them by hand; they are next tossed by canes held by a boy, one in each hand, so as to fall in a tuft, which is consolidated by several quick blows. The tuft is taken by a man and applied to a wheel, which he swings round with one hand, thus causing it to be twisted into a rough rope. A second tuft is worked in before the first is exhausted, and so the work goes on, the rope being occasionally wound up on the wheel, till enough is obtained for a bundle. In this form this kind of hair is often seen as a commercial article. The curled character is given to the hair by steeping the bundles a few hours in cold water, then drying them in a very hot oven, the heat of which is gradually reduced for 24 hours. When the ropes are now untwisted and picked to pieces, the hairs will be found to possess the peculiarly springy character of curled hair.

**HAIR POWDER**, a preparation of pulverized starch and some perfume, formerly used to whiten the head. Sometimes the powder was colored. The custom of using it was introduced from France into England in the reign of Charles II. It was occasionally practised by old men in the United States in the present century, but the fashion has at last entirely disappeared.

**HAKE**, a name properly applied to fishes of the cod family, of the genus *merlucius* (Cuv.), and improperly in New England to gadoids of the genus *phycis* (Artedi). There is great confusion in the application of the names to the first genus; the European *merlucius*, properly called hake, is styled the *merlan* or whiting in the Mediterranean; our *merlucius* is also generally called whiting, but the true whiting is a *merlangus*, one of the species of which we name pollack; the American hake, or *phycis*, is styled codling by De Kay, in order to avoid confusion.

The European hake (*merluccius vulgaris*, Cuv.) is generically distinguished from the cod by having only 2 dorsal fins, a single long anal, and no barbule on the chin; the head is flattened, the body elongated, the first dorsal short, the 2d dorsal and the anal long and deeply emarginated. The color on the back is ashy gray, and below dirty white. The wide mouth is provided with numerous long, sharp, incurved teeth on both jaws, on the palate, and in the pharynx. It is abundant in the ocean and in the Mediterranean, and on the coasts of Ireland and Cornwall in immense shoals from June to September during the mackerel and herring seasons; it grows to a length of 1 or 2 feet, is very voracious, and feeds principally on the last mentioned fishes. Its flesh is white and flaky, and is dried in northern countries like that of the cod; from its inferior quality it is commonly called "poor John;" the liver is a delicate dish, and was highly esteemed by the ancients. The American hake (*M. albidus*, Mitch.), very generally called whiting in New England, and sometimes silver hake, is 1 or 2 feet long; when alive, the upper parts of the body and sides are rusty brown with golden reflections, becoming leaden after death; silvery white beneath; iris silvery; dorsals and caudal rusty, pectorals and ventrals sooty, anal colorless, inside of the mouth purple, and lateral line lighter than the upper parts; the lower jaw is the longer, and the teeth are very long and sharp. It is found from New York northward, and is especially abundant in the British provinces; it is exceedingly voracious, pursuing the smaller fishes, and is caught in great numbers in some seasons both in nets and by hooks; its flesh, when fresh, is sweet and wholesome, but it soon becomes soft and tasteless; from the difficulty of preserving it, the fishermen do not take the trouble to salt it, and rarely use it except for bait and manure.—The American hakes of the genus *phycis* have an elongated body; 2 dorsals, the 1st triangular with the 8d ray filamentous and prolonged, the 2d commencing just behind the 1st and extending nearly to the caudal; the ventrals with a single ray at the base, afterward divided; anal long and single; chin with one barbule. The white or common hake (*P. Americanus*, Schneider) grows to a length of from 1 to 3 feet, and when alive is reddish brown above, bronzed upon the sides, and beneath whitish with minute black dots; upper edge of the dorsal black, as is the edge of the anal and end of the caudal; fins also dotted with black; after death the back becomes grayish brown, and the abdomen dirty white; the head is very flat above, broad, strongly convex back of the eyes, with prominent rounded snout and large eyes; upper jaw the longer, and both well armed with rows of sharp incurved teeth; teeth also on the vomer. It is found from the New Jersey coast northward, and is taken in large numbers in Massachusetts bay, the bay of Fundy, and the gulf of St. Lawrence during summer, chiefly on

muddy bottoms, and generally at night or in cloudy days; it feeds principally on small fish and crustaceans. It is an excellent fish for the table, fried or boiled, and for a chowder has no superior; its price is about half that of cod; it is also a valuable fish when salted, and in this condition is largely exported from the British provinces under the name of ling. On account of the sharp teeth of this, as well as of the preceding genus, it is necessary to protect the lines by wire for some inches above the hook, as a common cod line is very soon bitten off. There is a small species (*P. filamentosus*, Storer), called squirrel hake by the Massachusetts fishermen, which rarely exceeds a length of 18 inches or a weight of 2½ lbs.; the head is longer in proportion, the body more slender, top of the head depressed in its whole extent, and the filamentous ray of the 1st dorsal considerably longer than in the preceding species; there are no spots upon the pure white of the lower parts. Other species are described in America, on the coast of Europe, and in the Mediterranean.—The name hake is also erroneously given on the coast of New Jersey to the king fish, a scionoid of the genus *umbrina* (Cuv.), from its having a barbule on the chin.

HAKLUYT, RICHARD, an English historian of voyages and travels, supposed to have been born in London in 1553, died in 1616. After studying at Westminster school, he was sent in 1575 to Christchurch college, Oxford, where he applied himself especially to geography or cosmography, upon which he was appointed lecturer, and interested himself in the voyages then made to the new world by his own countrymen and others. He was master of arts and professor of divinity when in 1584 he accompanied the English ambassador Sir Edward Stafford to Paris, where he remained 5 years. He found there in the libraries a history of the voyages made to Florida by Laudonnière and others, which he published in French, and afterward (1587) in English. He also annotated and published in 1587 Peter Martyr's work *De Novæ Orbis*, which was translated into English at his suggestion by M. Lok, under the title of the "Historie of the West Indies." While in Paris he received a prebend of Bristol, and he was subsequently made prebendary of Westminster and rector of Wetheringset, in Suffolk. On his return to England he was appointed by Sir Walter Raleigh one of the company of gentlemen adventurers and merchants, to whom were granted large concessions under Raleigh's patent, in the hope that they would replenish Virginia with settlers. The work to which he owes his reputation is the "Principal Navigations, Voyages, Traffiques, and Discoveries of the English Nation" (1 vol., London, 1589; enlarged ed., 8 vols., 1598–1600; new ed., with additions, 5 vols., London, 1809–12). The second edition comprises the voyages to the north and north-east toward Lapland, Nova Zembla, and the mouth of the river Obi, the travels in Russia, Armenia, Tartary, &c., the voyages to

the south and south-east, and the expeditions to North America, the West Indies, and around the world. Many curious public documents, such as charters granted by the czar, the sultan, and other monarchs, to English merchants, are preserved in it. In many copies the voyage to Cadiz (forming pp. 607-'19 of the first vol.) is omitted, having been suppressed by order of Queen Elizabeth after the disgrace of the earl of Essex. The additions to the last edition comprise all the voyages printed by Hakluyt or at his suggestion, which were not included by him in his great collection. "The best map of the 16th century," says Hallam, "is one of uncommon rarity, which is found in a very few copies of the first edition of Hakluyt's voyages. It represents the utmost limit of geographical knowledge at the close of the 16th century, and far excels the maps in the edition of Ortelius at Antwerp in 1588." Anthony à Wood prophesied that the work of Hakluyt, "being by him performed with great care and industry, cannot but be an honor to the realm of England, because possibly many ports and islands in America, that are bare and barren and only bear a name for the present, may prove rich places in future time." An analysis of the contents of Hakluyt's collection is given in Oldys's "British Librarian."—The Hakluyt society, established in 1846, has published many narratives of old voyages and travels.

**HAKODADI**, a city of Japan, in the province of Matsumai, near the S. end of the island of Yesso, on the N. side of the strait of Tsugar, about 40 m. from the city of Matsumai, and nearly in lat. 42° N.; pop. estimated at 20,000. It is one of the 8 cities which, by the treaty of March 31, 1854, negotiated by Commodore Perry, were opened to American commerce. It lies at the foot of a mountain 1,181 feet high, and is built on the shore of a beautiful and spacious bay, which forms one of the best harbors in the world. The town consists of rows of broad streets, rising one above the other in lines parallel to the beach, and communicating with each other by cross streets. The main street is 2 m. in length. The houses are mostly of wood and 2 stories in height, with fronts open to the street, and deep projecting eaves to keep off the rain and the sunshine. At night the fronts are closed by folding doors or shutters. The principal shops are those for the sale of silk; they are well supplied with elegant crapes of bright colors, and with raw silks of delicate hues. There are many large temples in the city, some of the Sintoo and others of the Buddhist sect; some of the latter are well built and gorgeously decorated. They are generally situated in the elevated and retired parts of the town, and partially encircled by trees. A temple near the main street has lately had attached to it a bazaar for the sale of provisions and curiosities to foreigners. In the different quarters of the town are fire-proof stores, strongly built, with thick whitewashed walls, deep window gratings, and massive shutters. Among

the products which enter into the commerce of the place is a species of sea weed, the *Fucus saccharinus*, which is collected along the coast, bleached in the sun till it becomes perfectly white, and exported in considerable quantities to the southern provinces of Japan, where it is used for food, sometimes in a raw state, but generally after boiling, when it becomes soft and thick. Foreign ships in the port of Hakodadi can procure supplies of potatoes, rice, chickens, hogs, and fresh beef. Cargoes of rice can be obtained. There is an American consul and commercial agent stationed there. Coal mines have lately been opened, and are now worked near the city. Early in 1859 the imperial government ordered a telegraph line to be constructed from Yeddo to Hakodadi.

**HALBERD**, or **HALBERT** (Fr. *hallebarde*), a military weapon, a combination of the axe and spear, formerly carried by sergeants of infantry and artillery, and by the body guards of high personages. The weapon was formed of an axe, variously shaped, with a lateral projecting spur, and a perpendicular spear head, double-edged. This steel head was fitted on an ashen shaft 6 feet long, and was sometimes of ornamental design, gilded or damaskened. It was adapted both for cutting and thrusting, but was unwieldy for either purpose. Sometimes it is called the Danish axe, and also the Swiss halberd. Meyrick supposes that it came into use in France in the time of Louis XI., and in England of Henry VIII., though similar weapons were probably employed at a much earlier period.

**HALBERSTADT**, a town of Prussian Saxony, in the district of Magdeburg, on the right bank of the Holzemme, 50 m. by rail from Brunswick; pop. 21,000. It is a place of great antiquity. The principal public buildings are the Dom, or cathedral, a venerable Gothic structure, which contains one of the finest collections of the episcopal and priestly robes of the middle ages that can be found in northern Europe; and the church of Our Lady, erected in the 11th century, in the Byzantine style, with singular base-reliefs and wall paintings. The chief manufactures are woollen cloth, gloves, carpets, refined sugar, leather, tobacco, and chemical products. The poet Gleim gathered around him in this town a large circle of authors, which was called the poetical union of Halberstadt; and he was buried there.

**HALCYON DAYS**, a name given by the ancients to the 7 days which precede and the 7 days which follow the winter solstice, because during this period the halcyon, or kingfisher, deposited her eggs close by the margin of the sea; and as at that season the weather in southern Europe is generally mild and calm, the phrase "halcyon days" came to signify times of peace and tranquillity.

**HALDANE**, **ROBERT**, a British philanthropist, born in 1764, died Dec. 12, 1842. Though heir to a large property, he had a passion for a seafaring life, and in 1780 entered the royal navy. He served in the *Foudroyant* under Capt.

Jervia, afterward Earl St. Vincent, and specially distinguished himself. On the establishment of peace in 1788, he went in a mercantile capacity to Newfoundland and Lisbon, after which he retired from the navy, married, and settled on his estate of Airthrey. He welcomed the French revolution with an enthusiasm which exposed him to obloquy among his own countrymen; and the speedy disappointment of his hopes by the revolutionary excesses contributed to awaken his interest in religion, which he studied with the greatest care, both in its records and principles and in its practical results. Thoroughly convinced at length of the divine origin of Christianity, he resolved to consecrate his life to its advancement, having for his motto: "Christianity is every thing or nothing; if it be true, it warrants and commands every sacrifice to promote its influence; if it be not true, let us lay aside the hypocrisy of professing to believe it." He conceived a vast scheme of missionary labor in India, the missionaries to be accompanied by schoolmasters and a printing establishment, and all the expenses to be borne by himself. The plan was so novel that the East India company, suspecting some ulterior and sinister design, refused their sanction, and he was obliged to abandon it. Scotland was then selected as the field of his enterprise. He sold his estate, and devoted his means to hiring and erecting places of worship at Edinburgh, Glasgow, Aberdeen, and throughout the country, and in educating pious young men for the ministry. His efforts were attended with remarkable success. In 1816 he went to the continent for 8 years to extend his influence, and at Geneva and Montauban was indefatigable in impressing his views of the gospel especially upon ministers and upon candidates for holy orders. He originated a plan for the evangelization of Africa, and imported 80 children from Sierra Leone to receive Christian education, giving his bond for £7,000 to pay the expenses. At the commencement of his revival labors in Scotland he seceded from the established church, and adopted many of the tenets of Sandeman, with some rigid forms of discipline; and he afterward joined the Baptists, but gave no prominence to peculiar sectarian views. He published a work on the "Evidence and Authority of Divine Revelation" (Edinburgh, 1816), an "Exposition of the Epistle to the Romans" (London, 1835), and several minor writings.—JAMES ALEXANDER, brother of the preceding, born in Dundee, July 14, 1768, died in Edinburgh, Feb. 8, 1851. He went to sea in 1785 in the service of the East India company, obtained distinction as an enthusiastic and intrepid seaman, and, after making 8 voyages to Bombay and China, was in 1798 appointed captain of the *Melville Castle*. The voyage was deferred for 4 months, and in the interval he experienced a religious change like that of his brother, sold his commission and his share in the ship's property for £15,000, and retiring to Scotland engaged in religious

studies and contemplation. He soon resolved to devote himself to the service of religion, opened Sabbath schools, distributed tracts, and began to preach, first in the villages around Edinburgh, and then throughout Scotland. His principal associate was the African tourist John Campbell, and they itinerated through the country as far as the Orkneys, everywhere attracting large audiences, for which churches were immediately built by his brother Robert. In 1799 he became pastor of the Tabernacle, Leith walk, Edinburgh, in which office he continued without emolument for more than 50 years, with remarkable fidelity and zeal. His life with that of his brother, by Alexander Haldane (8vo., London, 1852), is one of the most interesting of Christian biographies.

HALDEMAN, S. S., an American naturalist and philologist, born near Columbia, Lancaster co., Penn., in 1812. He entered Dickinson college, where he remained until 1830, was appointed an assistant in the New Jersey geological survey in 1836, and in the Pennsylvania geological survey in 1837. While engaged upon the latter he discovered the oldest then known fossil, the *scolithus linearis*. In 1851 he became professor of natural history in the university of Pennsylvania, and about 1855 accepted the same chair in Delaware college, Newark, Del. He holds also the professorship of geology and chemistry to the agricultural society of Pennsylvania at Harrisburg, and is distinguished for his knowledge of entomology. In the "Bibliographia" of Agassiz, p. 168, is a list of 73 memoirs by Mr. Haldeman, on a wide range of subjects in conchology, entomology, and paleontology, published in the "Journal" and "Proceedings" of the academy of natural sciences and American philosophical society, Philadelphia, and the American academy and the natural history society at Boston, in the "American Journal of Science," the U. S. report of Stansbury's expedition, &c. Among the most important is the *Monographie du genre leptoxia*, published in Ohenu's *Illustrations conchyologiques*, Paris, with 120 illustrations, and the "Monograph of the Fresh Water Univalve Mollusca," published at Philadelphia in 8 numbers (1840-45). Of late years he has confined his attention almost exclusively to investigations into the philosophy of language, and has especially developed the powers of the consonant and vowel sounds. The final results are embodied in an essay which obtained in England in 1858 the highest Trevelyan prize over 18 European competitors. Prof. Haldeman chiefly insists upon the chronological order of consonantal and vowel mutation in the history of languages, and upon the organic necessities for the transposition, elision, absorption, transmutation, and adaptation of letters; but he has won success in the production of roots and the clearing up of false or obscure derivations. His memoir on the relations of the Chinese and English languages appeared in the "Proceedings" of the American association for the advancement of science in 1856.

**HALE, BENJAMIN, D.D.**, an American educator and author, born in Newbury (now Newburyport), Mass., Nov. 23, 1797. He was graduated at Bowdoin college in 1818, and immediately afterward became principal of the Saco academy. In 1819 he entered the theological seminary at Andover, Mass., and was licensed to preach as a Congregationalist in Jan. 1822. He became tutor in geometry and natural philosophy in Bowdoin college in 1828, and principal of the Gardiner lyceum, an institution for the education of persons designed for the more practical callings in life, as farmers, mechanics, &c. Here he remained about 4 years, and during that time, beside his ordinary duties, he published a work entitled "Introduction to the Mechanical Principles of Carpentry" (8vo., Boston, 1827). In 1827 he became professor of chemistry and mineralogy in Dartmouth college, Hanover, N. H., and held that office until it was abolished by the trustees in 1835. Previous to this, however, he had received orders in the Protestant Episcopal church. During his residence at Hanover Dr. Hale delivered lectures on chemistry, pharmacy, medical jurisprudence, and natural philosophy, to the classes in the medical department. About the time that his professorship was abolished he published his "Scriptural Illustrations of the Liturgy" (12mo., 1835). While at Dartmouth college he laid the foundation for its extensive and valuable geological and mineralogical cabinet, and was the chief architect in the reconstruction of this building. The winter of 1835-'6 he spent in St. Croix, W. I., in consequence of an attack of bronchitis. On his return in the following summer, he was elected to the presidency of Geneva (now Hobart Free) college, N. Y., and in October entered on his duties. In consequence of his labors and anxieties, arising from the depressed state of the college and its financial condition, his health became so far impaired that after a voyage to Europe in 1852-'3, with no permanent benefit, he resigned his presidency, Jan. 19, 1858. Beside the books above mentioned, Dr. Hale has published a number of sermons, addresses, and occasional pamphlets; devoted with very few exceptions to the work which he had more immediately before him—the building up of an educational institution in which there should be combined with the highest intellectual culture of the mind the systematic and correct training of the heart in the religion of the gospel and church of Christ.

**HALE, DAVID**, an American journalist, born in Lisbon, Conn., April 25, 1791, died in Fredericksburg, Va., Jan. 20, 1849. After an education acquired chiefly in the district school of his native place and in the library of his father, a Congregational minister, he removed in 1809 to Boston, where for many years he was engaged in commercial pursuits. During his residence there he was also a frequent contributor to the newspaper press. In 1827 he was invited to take charge of the business and commercial department of the New York "Journal of Com-

merce," then recently projected, and on Sept. 1 entered upon the duties of that position with the first number of the paper. In the latter part of 1828 he became associated with Gerard Hallock as owner and editor of the paper, a relation which he sustained until the close of his life. Under the management of Messrs. Hale and Hallock the "Journal of Commerce" attained an influential position among the New York journals, and the pen of the former was frequently employed with effect in its leading articles, notwithstanding the engrossing duties of the commercial department over which he presided. He was a prominent advocate of free trade, the sub-treasury, and other financial measures of the democratic party. In 1840 he purchased at a foreclosure sale the Broadway Tabernacle, then the largest hall for public uses, and particularly for religious meetings, in the city of New York. He was at that time a member of the Presbyterian church worshipping there, but in consequence of a recent protracted and earnest controversy with the session on the subject of the individual rights of members, his views of ecclesiastical supervision were tending to Congregationalism. Immediately after the purchase he accordingly invited such of the members of the old church as chose to join him in forming an orthodox Congregational church on the New England plan of individual freedom; and the result was the organization of a society which eventually became one of the largest and most influential in New York, the parent of many flourishing churches, and which still continues its career of prosperity. He leased the Tabernacle to the new society until 1845, and then sold it to them at the original cost, deducting the net earnings, notwithstanding its value had in the mean time considerably increased. He gave liberally to other churches, and for a number of years maintained from one to three missionaries in the thinly settled portions of the country. His liberality was displayed in many other walks in life, his aim being to afford assistance to worthy objects in proportion to his income. He was living in Virginia for the benefit of his health at the time of his death.

**HALE, JOHN PARKER**, an American statesman, born in Rochester, Stafford co., N. H., March 31, 1806. He received an academical education at Phillips academy, Exeter, entered Bowdoin college in 1823, and was graduated with distinction in 1827. Among his fellow students in college were Franklin Pierce, Nathaniel Hawthorne, Henry W. Longfellow, S. S. Prentiss, and Professor Stowe. In 1828 he went to Dover, N. H., to reside, studied law, and was admitted to the bar in 1830. He soon gained a large practice, and in 1832 was elected to the legislature of New Hampshire as a democrat. In 1834 he was appointed by President Jackson U.S. attorney for the district of New Hampshire, a position which he held till 1840, when he was removed by President Tyler on party grounds. In March, 1843, he was elected by the democratic

party of his congressional district to the U. S. house of representatives. The contest on the slavery question had already begun in congress, and Mr. Hale took side with the opponents of slavery, against the preponderating influence of his party in New Hampshire and throughout the country. A democratic convention, however, renominated him for congress in view of the expiration of his term in March, 1845; but having in January of that year published a letter strongly denouncing on anti-slavery grounds the proposed annexation of Texas, the democratic leaders in New Hampshire proclaimed him a traitor to the party, called a new convention in his district, and nominated a "regular democratic candidate" in opposition to him. Mr. Hale ran as an independent candidate, receiving many whig and liberty party votes; but as a majority was required to elect, and there were more than two candidates in the field, there was no choice in spite of repeated trials, and the district was not represented in that congress. In 1846 Mr. Hale was elected to the New Hampshire legislature from the town of Dover, and was chosen speaker of the house of representatives. His independent defiance of party dictation on the question of slavery gave him a strong hold upon the favor of men of all shades of political opinion, and in 1847, by a combination of votes from several parties, he was elected to the U. S. senate. When he took his seat he was almost the only senator elected on anti-slavery grounds, and was the only one who was not connected with one or the other of the great political parties, the whig and democratic. Many attempts were made to intimidate him in the excitement of debate, but his humor, good nature, and power of witty and sarcastic retort enabled him to hold his ground alone and unsupported against the most formidable parliamentary assaults. In 1851 Mr. Hale was engaged as counsel for the defendants in the important trials which arose out of the forcible rescue of the fugitive slave Shadrach from the custody of the U. S. marshal at Boston. In 1852 the national convention of the free soil party nominated him for president of the United States, in opposition to Scott and Pierce, the whig and democratic candidates. He received 157,685 votes, of which 440 were from slave states. His term in the senate expired in 1858, and the democrats having regained control over New Hampshire, Mr. Atherton was chosen senator in his place. Mr. Hale on leaving the senate for a time established himself in New York in the pursuit of his profession, though he maintained his residence in New Hampshire, where his family continued to reside. On Mr. Atherton's death he was reelected to the senate in 1855 to fill the vacancy, and was again chosen in 1858 for a full term of 6 years.

HALE, SIR MATTHEW, an English jurist, born in Alderley, Gloucestershire, Nov. 1, 1609, died there, Dec. 25, 1676. His father, originally a lawyer, abandoned his profession on account of

conscientious scruples. The son, an orphan at an early age, was committed to the care of a Puritan relative, who placed his ward in 1626 at Magdalen hall, Oxford. The influence of his puritanical tutor was here remitted, and the reaction led the youth into various wild plans which were happily but accidentally frustrated. He had been designed for the church, but had himself decided upon joining the army of the prince of Orange. Becoming involved however in a lawsuit with a person who had claim to part of his paternal estate, he exhibited so much acuteness of understanding, and such aptitude of mind for legal science, that the lawyer who was charged with the defence of his case persuaded him to give his attention to law as a profession. He applied himself with remarkable diligence, reading, it is said, for several years at the rate of 16 hours a day. During this period of his life an adventure in a drunken frolic revived his early inclination to serious habits, and confirmed in him that sense of piety which characterized his subsequent career. A fellow student fell from the table at which they were carousing in a kind of fit Hale, deeply impressed with the scene, solemnly vowed never to drink a health again. He is said to have scrupulously kept his vow, although upon the restoration of the Stuarts it was a source of serious inconvenience; drinking being a test of loyalty in politics, and somewhat of orthodoxy in religion. The variety of his studies was remarkable. Philosophy, anatomy, and physiology, as well as theology, are mentioned as only a part of the subjects which received his attention. He probably began practice as a barrister in 1636; and he was employed in most of the celebrated trials growing out of parliamentary troubles in 1640. Bishop Burnet states that Hale was assigned as counsel for Lord Strafford, but he is believed to have been only privately retained by that nobleman to assist in his defence. In 1643, however, he was expressly assigned by parliament as counsel for Archbishop Laud. In 1647 he was appointed one of the counsel for the eleven members of the commons whose impeachment was demanded by the army. He is said to have been retained as counsel for the defence of Charles I.; but as the king refused to acknowledge the jurisdiction of the court, his counsel took no public part in the proceedings of the trial. He was also retained by the duke of Hamilton in his defence. In 1648 Hale took the covenant as prescribed by the parliament, and appeared with other laymen occasionally in the assembly of divines. In 1651 he professed allegiance to the commonwealth, "without king or house of lords;" and in the following year was one of a commission for considering the expediency of reforming the law. He had many scruples at first about serving under Cromwell; the protector's importunity, however, in seeking his services, at length overcame his objections. He was raised to the bench of the court of common pleas in 1654, and soon

After was returned to Cromwell's first parliament for his native county. His motive, says Burnet, was rather to hinder mischief than the hope of doing much other good. The rescue of the records and treasures of the tower from a number of enthusiasts who would have them destroyed as remnants of feudal tyranny, is due to the authority and clearness of Hale's argument in the debate. Several instances are related of his resolute rejection of the arbitrary dictation of Cromwell in the administration of law. On one occasion he discharged a jury which he discovered had been packed by express directions of the protector. Cromwell reprimanded him severely, adding: "You are not fit to be a judge." "That," replied Hale quietly, "is very true;" and soon after he declined to serve in the trial of some unfortunate gentleman who in 1655 revolted against Cromwell's authority. In 1659 he represented the university of Oxford in the parliament which met after the death of Cromwell; and in the following year he sat again for Gloucestershire in the convention which recalled the Stuarts. He offered a resolution to empower a committee to examine the concessions offered by Charles I. during the war, with a view to set reasonable limits to the powers of the new king, but this measure was defeated by Monk. Soon after the restoration, the lord chancellor, Clarendon, offered to him, and with some difficulty persuaded him to accept, the appointment of lord chief baron of the court of exchequer (1660). This dignity was accompanied with knighthood, to which the incumbent consented reluctantly. His name appears among the commissioners for the trial of the regicides, but it is supposed that he was not present at the trials. During the period that he sat in the court of exchequer, however, a circumstance occurred in connection with Hale which has been the subject of much animadversion. Two women were indicted for witchcraft. The lord chief baron is reported to have admitted to the jury that he did not doubt the existence of "such creatures as witches." The women were condemned and executed. He was the last English judge to sanction the conviction of prisoners charged with this crime. After the great fire of London in 1666, Sir Matthew's exertions and patience in extra-judicial duty, in decisions of amounts of payment due to individuals whose premises were taken by the government with a view to improvements in the rebuilding of the city, obtained for him the highest praise. "He was," says Baxter, "the great instrument for rebuilding London; his prudence and justice removing multitudes of impediments." In 1671 Hale was made chief justice of the court of king's bench, and 4 years later he was attacked by inflammation of the diaphragm, which in 1676 compelled him to retire upon his pension. Withdrawing to a humble abode at Acton, he amused himself principally in the study of mathematics and physics. He was twice married; and by his first wife, the daughter of Sir Henry Moore, he had 10 children,

most of whom turned out badly. His second wife was a servant girl, whom he married in order to have a nurse in his declining years, and whom in his will he called a "most dutiful, faithful, and loving wife." She was appointed one of his executors, and to her he confided the education of his grandchildren. After his death were published several works which have created for him as high a reputation in the character of a legal and constitutional writer, as he had in that of a judge. His "History of the Pleas of the Crown" (*Historia Placitorum Corona*, 8vo., 1678, several times edited with additions by various hands), a work of great authority, and the "History of the Common Law" (8th ed. by O. Runnington, 8vo., London, 1820), may be specially cited. The treatise on the "Original Institution, Power, and Jurisdiction of Parliament" (8vo., 1709), which bears his name, was written, according to Hargrave, by some other person. Sir Matthew Hale's moral and religious works, with his life by Bishop Burnet, were published by the Rev. T. Thirlwall (2 vols. 8vo., London, 1805).

HALE, NATHAN, an American revolutionary officer, born in Coventry, Conn., June 6, 1755, executed as a spy in New York, Sept 22, 1776. He was graduated at Yale college in 1773 with high honor, and soon afterward engaged as a teacher, first at East Haddam, and afterward at New London, with great success. His parents intended him for the ministry; but on the Lexington alarm in 1775 he wrote to his father, saying "that a sense of duty urged him to sacrifice every thing for his country," and soon after entered the army as lieutenant, and in a few months was promoted to be captain. While with the troops near Boston he was vigilant and faithful in every point of duty; and in Sept. 1776, when in New York, he, with an associate, planned and effected the capture of a British sloop laden with provisions, taking her at midnight from under the guns of a frigate, and distributing her prize goods to the American soldiers. After the retreat of the army from Long island, when it was all-important to understand the plans of the enemy, Washington applied for a discreet and practised officer to enter the enemy's lines and procure intelligence, and Hale volunteered for the service. He passed in disguise to the British camp and made full drawings and memoranda of all the desired information, but on his return was apprehended and taken before Howe, by whom he was ordered for execution the next morning. He was denied a Bible and the aid of a clergyman; the letters he had written to his mother and sister were destroyed, and he was hanged, saying with his last breath: "I only regret that I have but one life to lose for my country." Dwight has celebrated his virtues both in prose and verse, and his life, by Stuart, was published in 1856.

HALE, NATHAN, LL.D., nephew of the preceding, an American journalist, born in West-hampton, Mass., Aug. 16, 1784. He was graduated at Williams college in 1804; studied



law, and afterward served two years as the mathematical and English instructor in Exeter academy, N. H. He then removed to Boston, where he has since resided. He was admitted to the bar in 1810, and continued in the practice of the law for 4 years. At this period he engaged with Mr. Henry D. Sedgwick in editing the "Boston Weekly Messenger," a political and historical journal, which is still published. It was the first weekly periodical in America published without advertisements, and devoted to politics and literature. In 1814 he purchased the "Boston Daily Advertiser," which had been established the preceding year. It was the first daily journal in New England, and for many years the only one. In conducting it he at once introduced the principle of established editorial opinion and responsibility, distinct from the responsibility of individual contributors. The "leader," so called, now universal in all newspapers, was unknown in New England before the "Messenger" and the "Advertiser." The older papers were simply announcements of news, and receptacles of any advertisements or other contributions which might be sent to the printers. The influence of the "Boston Daily Advertiser" thus became a power in New England entirely different from that wielded by any earlier journal. While there was a federal party, the "Advertiser" was a federalist journal; while there was a whig party, it was whig. Mr. Hale gave its whole influence in 1820 to oppose the Missouri bill, and in 1854 to oppose the Nebraska bill. It was the first journal to suggest the immediate free colonization of Kansas, and Mr. Hale devoted it to that enterprise. In 1825 he published a map of New England, which is still a standard authority. In 1828 he published a work on the protective policy which attracted much attention. He was also an early advocate of railroads in New England, and in 1828 was the acting chairman of the Massachusetts board of internal improvements. He was the first president of the Boston and Worcester railroad corporation, the first road on which steam power was used in America; he continued in this office 19 years. In 1846 he was appointed chairman of the commission for introducing water into the city of Boston. He was one of the club which founded the "North American Review," and of that which founded the "Christian Examiner." He has often served in both branches of the Massachusetts legislature, and has been a member of each of the constitutional conventions held in Massachusetts since his manhood. In his earlier life he was an active member of the Massachusetts historical society and of the American academy of arts and sciences. He brought power presses into use in Boston, and took an active interest in the introduction of stereotyping, and of many other improvements in the arts which are now matters of course. His stereotyped maps, on a plan of his own invention, first published in 1830, were the earliest on any such plan in America.

HALE, SARAH JOSEPHA, an American authoress, born in Newport, N. H., in 1795. Her maiden name was Buell, and she was married about the year 1814 to David Hale, a lawyer of eminence, in connection with whom she pursued a regular course of study till his death in 1822. Devoting herself to authorship, she published the "Genius of Oblivion, and other Original Poems" (Concord, 1823), which was followed by "Northwood, a Tale of New England" (3 vols., Boston, 1827). In 1823 she removed to Boston, having become editor of the "Ladies' Magazine," a monthly miscellany, which she conducted till in 1837 it was united with the "Lady's Book" of Philadelphia, of which magazine she has ever since been the literary editor. Many of her compositions, subsequently issued in volumes, first appeared in these magazines. Her principal publications are: "Sketches of American Character;" "Traits of American Life;" "Flora's Interpreter," of which more than 40,000 copies have been sold; the "Good Housekeeper," a manual of cookery; "Grosvenor, a Tragedy" (1835), founded on the story of Col. Isaac Hayne, the revolutionary martyr of South Carolina; metrical romances entitled "Alice Ray" (1846), "Three Hours, or the Vigil of Love" (1848), and "Harry Guy" (1848); a "Complete Dictionary of Poetical Quotations" (Philadelphia, 1852); "The Judge, a Drama of American Life;" and her most important work, "Woman's Record, or Sketches of all Distinguished Women from the Creation to A. D. 1854" (2d ed., New York, 1855), an octavo volume of 910 pages, closely printed in double columns. She has also edited several annuals, and the letters of Mme. de Sévigné and of Lady Mary Wortley Montague.

HALES, ALEXANDER OF. See ALEXANDER OF HALES.

HALES, STEPHEN, an English clergyman and natural philosopher, born in Beekesbourn, Kent, Sept. 7, 1677, died in Teddington, Middlesex, Jan. 4, 1761. In 1717 he became a member of the royal society, and in 1758 he was admitted a foreign associate of the French academy of sciences. His treatise on "Vegetable Statics" (1727) was the first methodical work on the science of vegetable physiology. He was also the author of many useful inventions.

HALÉVY, JACQUES FRANÇOIS FROMENTAL ÉLIE, a French composer, born in Paris, May 27, 1799, of Jewish parents. At the age of 10 he entered the *conservatoire*, and soon became the favorite pupil of Cherubini, then at its head. He visited Rome for study, and in 1827 produced his first opera, *L'artisan*, at the *théâtre Feytaud*. It was not however until the production of his *Juive* in 1835 that he acquired any considerable reputation. Since that time he has been one of the most popular composers for the French stage, and has produced in rapid succession a number of operas, the best of which are *La reine de Chypre*, *Charles VI.*, *Les mousquetaires de la reine*, *La fête aux roses*, *La tempesta*, and *Le Juif errant*. Among his most re-

cent operas are *Valentine d'Aubigné* (1856), and *La magicienne* (1858). His works are instrumented with great skill, and reveal dramatic beauties of a high order. He is indebted, however, for much of the success which has attended them to the admirable manner in which they are produced at the *académie* in Paris. Without the accompanying spectacle they would lose half their effect. Halévy has been liberally honored by his countrymen and by foreign potentates. He succeeded Fétis as professor of composition at the *conservatoire*, is a member of the academy of fine arts, and since the death of Raoul-Rochette in 1854 perpetual secretary.

HALFORD, SIR HENRY, an English physician, born in Leicester, Oct. 2, 1766, died in London, March 9, 1844. He was the son of Dr. James Vaughan, a physician of Leicester, and took the name of Halford in 1814, upon inheriting a large estate from Sir Charles Halford, a distant relation on his mother's side. He was educated at Rugby and Oxford; was elected a fellow of the college of physicians in 1794, and almost immediately embarked in a large and profitable practice in London. He was made a baronet in 1809, and filled the position of physician to 4 successive sovereigns, George III., George IV., William IV., and Victoria. In 1824 he was elected president of the college of physicians. His published works consist of "Essays and Orations read at the Royal College of Physicians" (London, 1831), which, though devoted to medical subjects, are full of interest to the general reader; "The Deaths of some Eminent Persons of Modern Times" (8vo., 1835); and *Nugæ Metricæ* (12mo., 1842). The volume of "Essays and Orations" contains an account of the discovery of the head of Charles I. in the royal vaults of St. George's chapel, Windsor castle, into which he descended in 1818.

HALIBURTON, THOMAS CHANDLER, an English humorous writer, born in Nova Scotia in 1808, practised law there for many years, and eventually was promoted to the rank of judge. He has resided of late in England, and at the general election of April, 1859, he was elected to the house of commons as a member for Launceston, Cornwall. In 1835 he contributed to a weekly newspaper in Nova Scotia a series of humorous articles satirizing the Yankee character as exemplified in a clock peddler, which became popular both in the United States and in England, and were published with considerable alteration and many additions in 1837 under the title of "The Clockmaker, or Sayings and Doings of Samuel Slick of Slickville." He visited England in 1842, the results of which tour appeared under the title of "The Attaché, or Sam Slick in England" (2 vols. 8vo., London, 1843), to which 2 more volumes were afterward added. His remaining works are: "An Historical and Statistical Account of Nova Scotia" (2 vols., 1828); "The Clockmaker," 2d series (1838), and 3d series (1840); "Bubbles of Canada" (1839); "The Old Judge, or Life in a Colony" (1839); "Letter Bag of the Great

Western" (1839); "Ya Traits of American Human and Human Nature" (1840).

HALIBUT, a fish of the genus *hippoglossus* (Cuv.), characterized by a flat oblong body, the eyes and the right side; the lips large, the jaw the longer; both jaws armed with sharp and strong, card-like. The common (Cuv.) grows to a length varying in weight from 1 cimen is on record which 600 lbs., taken on the coast side is of an almost uniform the left or under surface instances, the eyes and the on the left side. The dorsal anterior third of the eye, portion of the caudal fin just back of the operculum small, beneath the base of the anal extends from the pectorals to near the tail in front of the anal fin, the the posterior the urinary from the coast of New York also on the northern shore Boston market is supplied George's banks and Nantuxmer it is caught by hook water, retiring to deeper abundant in the bay of Fund of Nova Scotia. It is an eel fish, feeding upon cod, haddock, erel, flounders, and other fish. Its flesh is coarse and dry, but by some, when boiled or considered a delicacy; large flesh, dried, salted, or smoked the Greenlanders and others. With us it sells for a higher price the English markets it is not. For the characters of this unsee FLOUNDER.

HALICARNASSUS, an ancient town in Asia Minor, on the coast the town of Boodroom now founded by a colony of Thracians one of the 6 Grecian cities of the Doric hexapolis. It was freed from that confederacy, and by the Persians under Darius Lygdamis, a Greek, to rule a dynast, on condition of acknowledging a monarch as lord paramount and his successors Halicarnassus a Grecian character and language faithful to Persia; and Artemides and successor, fought in the Salamis. About 380 B. C. the subject to independent Carian famous of whom was Mausolus brother of the younger Artemides.

renewed the magnificence of Halicarnassus, which was now falling into decay, built up its fortifications, and erected citadels, breakwaters, an arsenal, and a splendid palace. He died in 353, and over his remains Artemisia caused to be raised a monument so beautiful that it still gives a name to similar structures. Not long afterward the city returned under subjection to Persia by the marriage of one of its queens with a Persian satrap, and after a long siege it was taken by Alexander of Macedon, who destroyed most of it by fire. From this catastrophe Halicarnassus never wholly recovered. It afterward passed under the sway of the Ptolemies of Egypt, and still later of the Romans, who assigned it to the government of Rhodes after their victory over Antiochus the Great of Syria (190 B. C.); it was afterward annexed to the province of Asia. On the downfall of the Roman empire it was laid in ruins, and after the knights of St. John had occupied Rhodes they built here about 1402 a castle called the "tower of St. Peter," as a defence against the pirates of Turkey and Egypt and a means of facilitating the drawing of supplies from the surrounding country. At the time of the final siege of the island by the Turks (1522) the knights caused this fortress to be repaired with stones taken from the ruins of the ancient city. The place was known at this time by the name of Mesy. Halicarnassus was the birthplace of the historians Herodotus and Dionysius. —The plan of the city was grand and symmetrical. From the edge of the harbor, which runs into the land like a crescent, the buildings rose one above another on terraces formed partly by excavations from the rock and partly by walls of masonry where the natural inequalities of surface were very great. The first terrace was crowned by the Mausoleum, the second by the temple of Mars; at the foot of the first was the market place; two citadels occupied volcanic hills at the upper end of the city, while the whole was enclosed by a wall which can still be traced. The palace of Mausolus and the temple of Venus and Mercury, it has been supposed, stood on the two points of the harbor, forming the extremities of the city. The famous fountain of Salmaeis mentioned by Ovid in his "Metamorphoses," a theatre of which the ruins are yet prominent, and various beautiful temples, were among the other attractive features of this city, which Vitruvius describes in full as a model for the laying out of a great maritime town. By far its grandest object, however, was the Mausoleum, ranked among the 7 wonders of the world, and adorned by the labors of some of the most celebrated artists of that period. Its plan was that of a rectangular building surrounded by an Ionic portico of 36 columns, and surmounted by a pyramid rising in 24 steps, upon the summit of which was a colossal marble quadriga with a statue of Mausolus. The whole rested probably on a basement of solid masonry. The quadriga was the work of Pythis, and the 4 faces

of the building were adorned by 4 sculptors, the N. by Bryaxia, the E. by Scopas, the S. by Timotheus (or, according to Vitruvius, by Praxiteles), and the W. by Leochares. This magnificent building was still standing in the 12th century. It was overthrown either by an earthquake or more probably by lightning, before the building of the castle by the knights of St. John; and the detritus washed down from the hills, which filled the lower part of the city in some places to the depth of 20 feet, and concealed parts of the terraces, completely covered its site. The knights of St. John, in removing some half-buried white marble to serve in the repair of their castle in 1522, came upon an opening which led into a richly decorated and sculptured chamber, adorned with veneers of many-colored marble, bearing representations of battle scenes carved in mezzo-relievo. They broke up these slabs and used them for their mason work. From this hall a low entrance led into a smaller apartment, where they found a sarcophagus and a beautiful vase, which they left untouched, as the signal was given for retreat. The next morning they returned and found the tomb rifled. The chambers into which the knights thus penetrated were undoubtedly the interior of the Mausoleum. The spot remained unexplored for many years afterward, and meanwhile the natural agencies before mentioned hid all traces of it. Some sculptured friezes, however, from the exterior of the tomb, and several heads of lions, had been built into the castle, most of them serving to ornament the inner ward. Sir Stratford Canning, now Lord Stratford de Redcliffe, obtained from the sultan permission to remove them, and in 1846 a number of the slabs were deposited in the British museum. Most of them had suffered severely, the heads of the figures being nearly all wanting, but a few are magnificent specimens of art. All attempts to rediscover the Mausoleum proved futile, until in 1856 Mr. Charles F. Newton, the British vice-consul at Mitylene, undertook a more thorough search than had yet been made. Three ships were placed by government at his disposal, and most of the excavation was done by their crews. A number of Turkish houses had to be purchased and pulled down, and when proprietors refused to sell mines were run under their fields. Several experiments were made in digging before the site of the Mausoleum was reached. In one place were found hundreds of terra-cotta figures from 5 to 8 inches in height, which had apparently been cast in a mould. A villa of the Roman period was laid bare, and such of its rich mosaic pavements as could be removed were sent to England. Under the pavement was found a life-size statue of a dancing girl, but this, like the building itself, is not executed in a high style of art. In another place were found the remains of a palace with a mosaic pavement of pure Grecian taste. On Jan. 1, 1857, Mr. Newton began digging at the foot of the highest terrace, on the spot which he had

himself designated as early as 1848 as the probable site of the Mausoleum. Fragments of a frieze and columns, a lion like those on the acule, and a colossal arm, were soon brought to light; and the discovery of a marble equestrian statue placed it beyond doubt that the right place had at last been reached. The head of the horse and the whole upper part of the rider were missing, but the mutilated figure is still distinct with animation, and betrays the hand of a master. By the beginning of April Mr. Newton had cleared the entire rocky platform which formed the foundation of the building. It is almost a square, measuring 472 feet in circumference, and formed by quarrying into the living rock. A perfect level had been secured by filling up the depressions with flat stones held together by iron clamps. On the W. side of the platform there was a flight of steps leading to the upper terrace, and near the foot of it were collected alabaster jars, votive figures, and bones of oxen. The main entrance to the inner tomb was probably on this side, and was closed after the corpse had been carried in by a huge stone which was then in its place. Behind this stone was found a remarkable alabaster vase bearing two inscriptions, one in hieroglyphics enclosed by the oval ring which always surrounds the name of an Egyptian Pharaoh, the other in cuneiform characters, signifying, according to Sir Henry Rawlinson, "Xerxes the great king." In the rubbish which covered the foundation were imbedded parts of friezes and colossal statues, which from their position must have fallen from the outside of the building. Among them were 4 slabs found lying in a line along the E. front of the building, where Scopas sculptured, and representing a continuous subject, viz., a battle of Amazons. They are in admirable preservation, and far superior in execution to any of the others, and have an additional interest as being the only undoubted works of Scopas with which we are acquainted. Extending his excavations beyond the foundation bed, Mr. Newton came upon a wall of fine white marble encompassing the whole structure, with a circumference of 1,800 feet. It was nowhere complete, having been used as a quarry. Beyond this, at a place where the wall bulged outward as if from a violent shock, Mr. Newton unearthed a number of flat blocks of white marble, which were at once recognized as the steps of the pyramid, beside halves of two colossal horses, and portions of a chariot, evidently belonging to the quadriga. The figures, more or less complete, of several lions, a leopard, a woman in beautiful drapery without head or arms, the head of a man which proved to be that of Mausolus, and some ornamented lions' heads and capitals of columns, were also found here, some of them at a distance of 44 feet from the foundation. Parts of a chariot wheel were found on the other side. The relics collected from various other quarters comprised a number of standing or sitting statues from 8 to 12 feet high, many lions, the

busts of some of which were taken from the castle in March, 1857, parts of friezes, and a multitude of fragments, all which were packed with great care, and transported to the British museum. Here the task of restoring the mutilated works of art was undertaken, and the statue of Mausolus has at length been reconstructed out of 63 pieces, and is nearly complete. The face is handsome and intelligent, and shaded by a large moustache and short beard. The hair rises from the middle of the forehead, and falls in long curls. The body rests on the right leg, the left knee being somewhat bent, and the right arm was outstretched grasping the reins; the left arm confined the drapery in large folds. A female figure, wanting the head, has also been restored, and is perhaps one of the finest specimens of art recovered from Halicarnassus. There is another female figure enthroned, which was found on the side allotted to Scopas, and probably represents Artemisia, who died before the Mausoleum could have been finished. Like all the architectural and sculptured parts of the Mausoleum, it was painted. With the aid of the partial measurements afforded by Pliny, and a knowledge of the proportions which the different parts of an Ionic building should bear to one another, we are now able to reconstruct the Mausoleum with tolerable accuracy. The basement which enclosed the tomb was 65 feet high. The rectangular structure above this, surrounded by its colonnade, was 87½ feet high, and 411 feet in circumference, including the columns. The circumference of the pyramid was 388 feet, and its height 23½ feet, while the height of the quadriga and statue was 14 feet 8 inches, making the total elevation of the edifice 140 feet 3 inches. It is not difficult to conjecture upon what parts of the Mausoleum the sculptures were originally placed. The colossal human figures were probably between the columns on the upper edge of the basement, and the leopard and some of the lions which evince a higher style of workmanship than others might have stood by the chariot. The principal friezes, representing conflicts with Amazons, were evidently meant to be seen from a great distance below, and no doubt surmounted the columns, while a second and larger frieze, of which only a few fragments have been found, belong to the basement. The figures on these latter slabs are in basso-relievo, and executed with exquisite delicacy.

HALIFAX. I. A. S. co. of Va., bordering on N. Carolina, bounded E. and N. by Staunton river; area, 960 sq. m.; pop. in 1850, 25,962, of whom 14,452 were slaves. The surface is hilly and the soil is fertile, having yielded in 1850 more oats than any other county in the state, and more tobacco than any other in the Union excepting Prince George co., Md. The productions during that year were 146,769 bushels of wheat, 649,896 of Indian corn, 865,182 of oats, and 6,485,762 lbs. of tobacco. There were 9 grist mills, 1 saw mill, 51 churches, and 252 pupils attending public schools.

Value of real estate in 1856, \$5,866,885, showing an increase since 1850 of 40 per cent. The county contains a rich plumbago mine, and is crossed by the Richmond and Danville railroad. Organized in 1752. Capital, Banister, or Halifax Court House. II. A N. E. co. of N. Carolina, bounded N. E. by Roanoke river; area, 680 sq. m.; pop. in 1850, 16,592, of whom 8,594 were slaves. The surface is diversified, and the soil, which rests partly on extensive beds of granite, is fertile. The productions in 1850 were 879,040 bushels of Indian corn, 84,885 lbs. of tobacco, and 1,740 bales of cotton. There were 30 grist mills, 7 saw mills, and 2 newspaper offices. Value of real estate in 1857, \$2,257,087. The county is traversed by the Weldon and Wilmington railroad. Organized in 1758, and named in honor of the earl of Halifax. Capital, Halifax.

**HALIFAX**, a co. of Nova Scotia, bordering on the Atlantic, and drained by Shubenacadie, Musquodoboit, and other rivers; area, 2,450 sq. m.; pop. in 1851, 39,112. The surface, with the exception of a belt of high broken land, from 20 to 30 m. wide, along the coast, is tolerably level, and is dotted over with lakes. The harbors are exceedingly numerous, and 6 or 7 are spacious enough for ships of the line. A small part of the soil is fertile. Lead and slate are the most valuable minerals. The county is the most populous in Nova Scotia, and the inhabitants are engaged chiefly in commerce, ship-building, and the fisheries. Capital, Halifax.

**HALIFAX**, a city, seaport, and the capital of the preceding county and of the British colony of Nova Scotia, situated near the middle of the S. E. coast of Nova Scotia, on the W. side of a deep inlet of the Atlantic called Halifax harbor, lat. 44° 39' 42" N., long. 63° 35' 30" W., 84 m. E. from Annapolis, N. S., and about 550 m. by steamer route N. W. from New York; pop. in 1852, 26,000; in 1859, about 30,000. The city is built on the declivity of a hill rising 286 feet above the level of the harbor, and, including its suburbs, is about 2½ m. long and 1 m. wide. Its plan is regular, most of the streets crossing one another at right angles; many of them are spacious and handsome. The lower part of the city is occupied by wharves and warehouses, above which rise the dwelling houses and public buildings, while the summit of the eminence is crowned by an edifice in which is fixed the town clock, and by a citadel strongly built of granite. There is little uniformity in the appearance of the houses, some of them being handsomely built of stone or brick, others, equally attractive, of wood neatly painted, while many are stuccoed or plastered. The province building, in which are the government offices, the legislative chambers, and the city library, is an imposing freestone edifice, 140 feet long by 70 feet broad, with an Ionic colonnade. The government house, admiral's residence, Dalhousie college, military hospital, lunatic asylum, workhouse, gaol, theatre, assembly rooms, court house, exchange,

and some of the public schools, are the other most prominent structures. The city also contains a Free church college, a national school academy, a mechanics' institution, 2 or 3 banks and insurance offices, a savings bank, 10 newspaper offices, 4 or 5 Episcopal churches, a small Roman Catholic cathedral, and places of worship for various other denominations. In the N. part of the town there is a government dock yard thoroughly equipped, and said to be inferior to few except those of England. It covers an area of 14 acres, and forms the chief depot of naval stores in the British North American colonies. The harbor of Halifax is one of the best in the world. It extends about 18 m. inland, is accessible at all times, and opposite the city, where vessels usually anchor, is about 1 m. wide. Further up it contracts to ½ m. width, and finally expands into a beautiful sheet of water called Bedford basin, comprising an area of about 10 sq. m. A small arm branching off from the harbor a short distance below the city extends inland to within ½ m. of the basin, forming a peninsula on which the city is built. The harbor contains McNab's and 4 smaller islands, has 2 lighthouses, and is defended by several fortifications of considerable strength. There are 2 passages into the harbor, one on each side of McNab's island. The western is commanded by Fort George, and several batteries; the eastern, which has sufficient depth of water only for small vessels, lies under the guns of a formidable stone fort called Fort Clarence. Halifax is largely interested in the fisheries, and has manufactories of tobacco, confectionery, hats, paper, iron castings, furniture, carriages, soap, and spirits distilled from molasses. Its trade is chiefly with Great Britain, the United States, and the West Indies. Its imports consist of flour and provisions from the United States and British North America, and of British manufactures, wine, and East and West India produce; its exports, of timber, fish, oil, and furs, to Great Britain and the south of Europe; coal, gypsum, and other mineral products to the United States, beside timber, fish, cattle, and provisions to some of the southern states; and dried and pickled fish, timber, coal, grindstones, cattle, oats, potatoes, flour, butter, cheese, &c., to the West Indies. The following table shows the commerce of Halifax in 1858:

Countries.	Imports.	Exports.
Great Britain .....	2,495,516	228,574
British West Indies .....	86,868	167,777
“ North America .....	215,868	265,560
United States .....	860,987	154,138
Other countries .....	187,184	128,477
Total .....	3,847,736	611,738

The principal exports of 1851 were 191,803 quintals of dried fish, 96,650 barrels of mackerel, 43,559 of herrings, 8,284 boxes of smoked herrings, 4,227 barrels of alewives, 340 tierces and 6,412 barrels of salmon, 238 boxes of preserved fish, 78 barrels of pickled cod, and 8,493 casks and 86,028 gallons of oil. During

e year ending Sept. 30, 1858, 55 vessels of the United States, with an aggregate burden of 8,400 tons, entered, and 59 left the port, carrying ward cargoes valued at \$138,070 and outward cargoes valued at \$25,181; 384 vessels, measuring 23,056 tons, are owned at Halifax. There is a large coasting trade, chiefly in fish and agricultural and mineral produce, in exchange for dry goods, &c. The Cunard British mail steamers from Liverpool to Boston every second week stop at Halifax both going and returning, and here are regular steamers from Halifax to various ports of the United States, Bermuda, Newfoundland, Cape Breton, St. John's, N. B., Annapolis, and Windsor. Stage coaches connect the city with Pictou and Annapolis, and there is telegraphic communication with nearly all parts of the United States and British provinces. Several attempts have been made to open a canal from Halifax to Minas basin, at the foot of the bay of Fundy, the legislature having contributed a grant of £15,000 toward the cost of the work, but it is still unfinished. A railway was commenced in 1854 which will connect Halifax with Quebec and with the great railway systems of Canada and the United States, and 2 branch lines have been constructed as far as Windsor and Truro. The city was founded under the auspices of the earl of Halifax in 1749. On Sept. 9, 1859, it was visited by a conflagration which burned down 60 of the finest buildings, and destroyed \$1,000,000 worth of property.

**HALIFAX**, a municipal and parliamentary borough of England, in the west riding of Yorkshire, picturesquely situated on an acclivity which rises gently from the Hebble, near the junction of that stream with the navigable river Calder, 43 m. S. W. from York, and 217 by rail N. W. from London; pop. in 1851, 83,582. The principal public buildings are St. John's church, a handsome Gothic edifice; Trinity church, an elegant Grecian structure with Ionic pilasters and tower; St. James's church; and the "Piece Hall," a magnificent quadrangular edifice occupying over two acres of ground, and having 315 rooms for the storage and sale of goods. Halifax ranks next to Leeds and Bradford as a seat of the woollen and worsted manufactures.

**HALIFAX, EARL OF.** See MONTAGUE, CHAS.

**HALIFAX, MARQUIS OF.** See SAVILLE, GEORGE.

**HALIOTIDÆ** (Gr. *hals*, the sea, and *ous*, the ear), a family of the *gasteropoda*. The shells, distinguished by their ear shape, are nacreous, of low spiral form, aperture large and without operculum. Woodward also includes in this group some trochiform shells, the aperture of which, like that of the true haliotida, is notched or perforated. *Haliotis*, the genus, includes 75 known living species, and 4 fossil which are found in the miocene of Malta. The living shells are distributed in various seas of tropical and temperate regions. In Japan the animal is used for food. The familiar species *tuberculata*

is a flat, open shell, of beautiful mother-of-pearl inside, and of reddish brown, often mottled, without, its length 3 to 4 inches and breadth 2 to 3. The outer angle is perforated by a row of holes, which as this approaches the spire is continued with tubercles. The shells belong to deep water, and at low tide they are found at Guernsey attached to the rocks like limpets. On the shores of the Channel islands this species is called the ormer. The inhabitants collect it for food, making it tender by beating. They also use the shell as an ornament of their houses, fixing it in the plaster walls, where it glitters in the sunlight. It is also employed for inlaying and other ornamental purposes.

**HALL**, a N. E. co. of Ga., intersected by the Chattahoochee river and drained by the sources of the Oconee; area, 540 sq. m.; pop. in 1852, 8,802, of whom 1,214 were slaves. It is hilly, and not remarkably fertile, although there is good soil in the river bottoms. The productions in 1850 were 295,759 bushels of Indian corn, 67,914 of oats, 48,206 of sweet potatoes, and 505 bales of cotton. There were 35 grist mills, 7 saw mills, 14 churches, and 209 pupils attending public schools. Value of real estate in 1856, \$889,564. Gold, silver, lead, diamonds, rubies, emeralds, and amethysts have been found in this county. Organized in 1818. Capital, Gainesville.

**HALL, BASIL**, a British naval officer and writer of travels, born in Edinburgh in 1788, died in Portsmouth, Sept. 11, 1844. He entered the navy in 1802, and was made a post captain in 1817. His first literary production was an account of his personal observations while in command of the brig *Lyra*, which accompanied Lord Amherst on his mission to China. It was entitled "A Voyage of Discovery to the Western Coast of Corea and the Great Loo Choo Island in the Japan Sea" (4to., London, 1818), and attained considerable popularity both from the novelty of the information and the freshness of the style. He was afterward stationed off the Pacific coast of America during the progress of the revolution of the Spanish colonies, and on his return to England published an interesting record of his experiences and observations under the title, "Extracts from a Journal written on the Coasts of Chili, Peru, and Mexico in 1820-'22" (2 vols. 8vo., 1824). His next work, "Travels in North America," which he visited in 1827 and 1828 (8 vols. 8vo., 1829), is perhaps the best known of his writings on account of the partial and hostile views which it was supposed to take of the institutions of the United States, and which subjected it to many severe comments from the American press. He wrote other books of travel, mostly of a fragmentary character, and a variety of scientific papers. In the latter part of his life his intellect became impaired, and he died insane at a hospital.

**HALL, DOMINICK AUGUSTINE**, an American jurist, born in South Carolina in 1765, died in New Orleans, Dec. 19, 1820. He was bred to the law, and commenced its practice in Charles-

ton, S. O. In 1806 he was appointed by President Jefferson U. S. district judge for Orleans territory, then recently organized, a position which he occupied until the formation of the territory into the state of Louisiana in 1812. President Madison immediately appointed him U. S. judge for the new state. He resigned the office in Feb. 1818, to accept a seat on the bench of the supreme court of Louisiana, but was reappointed to it in the following June, and remained a federal judge until the close of his life. On Dec. 15, 1814, his court was ordered to be adjourned for the space of 3 months, "owing to the military operations of the British forces against New Orleans." In the early part of the succeeding March, the city being then under martial law by the proclamation of Gen. Jackson, the military commander of the district, Judge Hall granted a writ of habeas corpus for the release of Louis Loutallier, a member of the legislature of Louisiana, then under arrest by order of Gen. Jackson for exciting a mutiny among the troops, by publishing a statement in the "Louisiana Gazette" of Feb. 10 that a treaty of peace had been signed. The general, instead of obeying the writ, immediately caused Judge Hall to be arrested and confined. Peace between the United States and Great Britain having been formally proclaimed on the 18th of the month, and martial law removed, Judge Hall was released on the succeeding day, and immediately summoned Gen. Jackson to answer for a contempt of court in disregarding the writ of habeas corpus, in detaining an original paper of the court and imprisoning its judge. The general appeared in person and by his counsel, and, after argument from the latter, was on March 31 sentenced to pay a fine of \$1,000. He at once submitted to the judgment of the court, and paid the fine, which was refunded to him with interest by act of congress in 1844.

HALL, GORDON, the first American missionary at Bombay, born in Tolland, Mass., April 8, 1784, died in India, March 20, 1826. He was early distinguished for mental activity and love of books, and was graduated at Williams college in 1808, with the highest honors of his class. Having studied theology, he offered himself as a missionary to the American board of commissioners for foreign missions, and having been ordained at Salem, Feb. 6, 1812, sailed the same month for Calcutta. Arriving at Bombay in 1813, he there spent 13 years in missionary labors. In 1826, while making one of his missionary tours, and engaged in ministering to the sick where the cholera was raging, he was seized with that disease, and died in 8 hours. He was a man of great force of mind and decision of character; of ardent piety, and entire devotedness to the missionary work, for which he was in all respects remarkably qualified. No missionary in western India has ever been more respected among the Brahmans and higher classes, for his discussions and pulpit discourses, than Mr. Hall. His publications consisted of 8 or 4 sermons and tracts.

HALL, JAMES, an American judge and author, born in Philadelphia, Aug. 19, 1793. He began the study of law in his native city, but abandoned it to join the army in the war of 1812, and rendered distinguished service in the battle of Lundy's Lane, at Niagara, at the siege of Fort Erie, and on other occasions. At the close of the war he was appointed an officer in the bomb vessel which accompanied Decatur's squadron against the Algerines, and enjoyed a short cruise in the Mediterranean. Returning in 1815, he was stationed at Newport, R. I. and other ports, until 1818, when he resigned his commission and resumed the study of law at Pittsburgh, Penn. In 1820 he removed to Shawneetown, Ill., and began to practise at the bar and to edit a weekly newspaper, the "Illinois Gazette." He was soon appointed circuit attorney or public prosecutor, in a circuit of 10 counties, and has written interesting sketches of his mode of life, travelling on horseback by bridle paths, fording rivers, sleeping in log cabins or "camping out," and having to deal with gangs of counterfeiters, horse thieves, and other rogues who congregated on the borders of the Ohio river, constantly changing their names and jurisdictions, and, if detected, surrounded by sympathizers ready to rise for their rescue. The duties of this office, requiring both discretion and courage, he fulfilled for 4 years, when he was elected judge of the circuit court, in which he presided till after 8 years it was abolished by a change in the judiciary system. He also held for 4 years the office of state treasurer in connection with a large legal practice, with the editorship of the "Illinois Intelligencer," a weekly newspaper, and with other literary labors. In 1833 he removed from Vandalia, the capital of the state, to Cincinnati, where he has since resided. He has been since 1836 connected with financial interests, first as cashier of the commercial bank, and since 1853 as president of another institution of the same name. His numerous literary productions consist chiefly of sketches for periodicals, of works illustrative of the political character and statistics of the West, and of tales illustrative of its romance and adventure. In 1820 he began for the "Portfolio," then edited by his brother, a series of "Letters from the West," which in 1828 were collected and published in a volume in London without his concurrence. He edited and contributed largely to the "Western Scourer" (Cincinnati, 1829), the first annual attempted in the West. In 1830 he established at Vandalia the "Illinois Monthly Magazine," which he owned and edited, furnishing nearly all its various matter, and which was continued at Cincinnati from 1833 to 1835 under the title of the "Western Monthly Magazine," and was sustained by a large subscription. He published successively his "Legends of the West" (Philadelphia, 1832; 2d ed. 1833); the "Soldier's Bride, and other Tales" (1832); the "Harpe's Head, a Legend of Kentucky" (1833); "Sketches of the West" (2 vols., Philadelphia,

35); "Tales of the Border" (1835); and "Statistics of the West at the close of 1836" (Cincinnati, 1836), a new edition of which appeared under the title of "Notes on the Western States" (Philadelphia, 1838). During the presidential canvass of 1836, when Van Buren and Harrison were the candidates, he published a biography of the latter. He undertook with T. McKenney an elaborate and costly "History of the Indian Tribes" (8 vols., Philadelphia and Washington, 1838-'44), for which he furnished early all the text. The work consisted of 120 portraits of celebrated chiefs, each of which was accompanied by a memoir written from authentic original materials collected with great labor. It was published in expensive style, the price per copy being \$120. The later publications of Judge Hall are the "Wilderness and the War Path" (New York, 1845); an address before the mercantile library association of Cincinnati (1846); a "Life of Thomas Posey," in Sparks's "American Biography" (2d series, vol. ix.); and the "Romance of Western History" (Cincinnati, 1857). His various writings, marked by amenity of sentiment and purity and liveliness of style, have contributed much to the intellectual improvement of the West. A uniform edition of his works appeared in 4 vols. in 1853.—JOHN E., brother of the preceding, an American author, born in Dec. 1783, died June 11, 1829. He was educated at Princeton college, studied law, and began to practise in Baltimore in 1805. He was soon elected professor of rhetoric and belles-lettres in the university of Maryland. He wrote a biography of Dr. John Shaw, prefixed to an edition of his poems (1810), and prepared an edition of Wirt's "British Spy." He acted with the federalists, and was severely wounded in the Baltimore riot of 1811. From 1808 to 1817 he published the "American Law Journal" (6 vols., Philadelphia). Removing to Philadelphia, he became editor of the "Portfolio" in 1816, and among his contributions were the "Memoirs of Anacreon," which attracted much attention. In 1827 he edited the "Philadelphia Souvenir," and published "Memoirs of Eminent Persons," and in the same year resigned the editorship of the "Portfolio" on account of declining health. He edited also several legal works.

HALL, JAMES, an American geologist and paleontologist, born in Hingham, Mass., of English parents, in 1811. From 1831 to 1836 he pursued his studies under the direction of Amos Eaton, the distinguished professor and teacher of the natural sciences, at the Rensselaer school in Troy, N. Y. Being appointed one of the New York state geologists, he entered in 1837 upon the survey of the western district of the state. His report upon the geology of this district, published in 1843, forms one of the quarto volumes of the series devoted to the natural history of New York. The fossil remains with which the strata are filled attracted his special attention; they were carefully figured on wood, both by his own hand and by that of Mrs. Hall,

described in his reports, and accurately referred to the strata in which they occurred. This study, assiduously pursued, enabled him to trace out and identify the several palæozoic formations over their range through the western states, a work which he has prosecuted with distinguished ability. His labors in this department are principally embodied in the 8 volumes of the palæontology of New York, already published, which contain descriptions and illustrations of about 1,000 species of fossils from the lower and middle silurian rocks. It is upon this great work—the most comprehensive treatise on American palæontology ever published—that the fame of Prof. Hall is chiefly based. The 1st volume appeared in 1847, the 2d in 1852, and the 3d in 1859. In this the description of the fossils is carried up to the devonian period. Other volumes will be required to complete the work as proposed by the author, describing the fossils up to the coal formation, and also those of the American post-tertiary. In 1845 and 1846 he communicated to the American association the results of his investigations of the metamorphic formations found between the Hudson and Connecticut rivers, showing that they were the representatives of the older fossiliferous rocks of New York, distinguishable among themselves by their peculiar minerals, as the unaltered strata are by their fossils—views which he has subsequently often advanced. He investigated the geology of the distant western territories by means of agents sent at his own expense to the Mauvaises Terres, and by the study of the collections from the Mexican boundary survey submitted to him by Major Emory, and of others from other regions. He was thus led to the conclusion that the discrepancies observed in the distribution of the fauna of the cretaceous period are not owing, as was supposed, to climatic influence, but to the inequality of development of the strata in different localities. When in 1850 the progress of the state survey of New York was suspended by act of the legislature, Mr. Hall still continued his palæontological researches, collecting and describing the fossils of New York and other regions at his own expense. In 1855 he was invited to take this department of the Canadian survey under the direction of Sir William E. Logan. The state legislature, however, at this time arranging with him for the continuation and completion of the great work upon which he was employed, and being appointed state surveyor of Iowa in 1855, and of Wisconsin in 1857, his Canadian investigations were chiefly limited to the study of the graptolites, of which genus he has described 25 new species, throwing much new light upon the true form and mode of growth of these organisms. Of the Iowa report two volumes have been published by Messrs. Hall and Whitney. (See GEOLOGY, IOWA, and LEAD.) In the pursuits of Prof. Hall we notice a capacity of mind for two distinct classes of investigation, not often met with in the same individual. While devoting him-



self to the study of the minute forms of organic structures, and discriminating between and classifying these with the utmost precision, he has also successfully traced out and arranged in their true order over vast areas the formations to which they belong; and still more in dynamic geology has investigated the forces to which these formations owe their existence where they are now met with. Thus he was led to the original theory respecting the elevation of mountain chains, of which a sketch is given at the close of the article *Geology*. In 1850 Mr. Hall was elected by the geological society of London one of its 50 foreign members, and in 1858 the same society conferred upon him the distinction of the Wollaston medal. He is a member of numerous European and American scientific societies, and has furnished many important papers to their "Transactions." For many of the government reports of the western surveys, the descriptions of the fossils collected are by Prof. Hall; as in the reports of Col. Fremont, of Major Stansbury, of the United States and Mexican boundary survey, and others.

HALL, JOSEPH, an English prelate and author, born in Ashby-de-la-Zouch, Leicestershire, July 1, 1574, died in Higham, near Norwich, Sept. 8, 1656. He was educated at Cambridge, took holy orders, and, after several minor benefices, received the deanery of Worcester in 1617. He was in the following year a deputy to the synod of Dort, was made bishop of Exeter in 1627, and translated to the see of Norwich in 1641. In the latter year he joined with the bishops who protested against the validity of laws made during their forced absence from parliament, and was committed for a time to the tower. In 1643 his revenues were sequestrated and his personal property pillaged. His fervent piety, which exposed him to the charge of Puritanism, his opposition to the Arminianism of Laud, and his able maintenance of episcopacy during the ascendancy of the Presbyterians, embroiled his life. From 1647 he lived on a small farm in Higham. Most of his works were practical and devotional. Of his prose writings, those most esteemed are his "Contemplations on the Historical Passages of the Holy Story" (3 vols., London, 1612-'15); "Characters of Virtues and Vices" (London, 1608); a Latin treatise, *Mundus Alter et Idem* (Hanover, 1607; translated into English by John Healey); and "Christian Meditations" (1640). His satires, entitled "Virgidemiarum, Six Bookes" (London, 1597-'8), were esteemed by Pope among the best poetry and the truest satire in the language, and were highly commended by Warton. According to Thomas Fuller, he "was commonly called our English Seneca for the pureness, plainness, and fulness of his style. Not unhappy at controversies, more happy at comments, very good in his character, better in his sermons, best of all in his meditations. A witty poet when young, a painful preacher and solid divine in his middle, a patient sufferer in his old age."

HALL, LYMAN, one of the signers of the declaration of independence, born in Connecticut about 1781, died in Burke co., Ga., in Feb. 1791. He was graduated at Yale college in 1747, studied medicine, and removed in 1752 to South Carolina, and the same year to Sunbury, Ga., where he engaged in the practice of his profession. At the opening of the revolution he zealously espoused the cause of the colonies, and was influential in inducing Georgia to join the confederacy. In 1775 he was chosen a member of congress, and was annually re-elected till 1780, at the close of which year he finally retired from the national legislature. When the British temporarily had possession of Georgia, they confiscated all his property. After their expulsion he was elected governor in 1753, and after holding this office for one term, retired from public life some 6 years before his death.

HALL, MARSHALL, an English physician, born in Basford, Nottinghamshire, in 1790, died in Brighton, Aug. 11, 1857. At the age of 19 he was sent to the university of Edinburgh, where he prosecuted his studies in medicine and chemistry with an eagerness and speculative spirit which the accepted doctrines of neither science could satisfy. In the latter department he pointed out the distinction between all chemical bodies, which ruled their chemical affinities, caused by the presence or absence of oxygen. From his study at this time of morbid anatomy in close connection with clinical medicine resulted his celebrated "Treatise on Diagnosis." Having taken his degree of M.D. in 1812, he officiated for 2 years as house physician at the royal infirmary in Edinburgh, visited the medical schools of Paris, Berlin, and Göttingen, and settled in Nottingham in 1815. He soon obtained a large and lucrative practice, and was appointed physician to the general hospital of the city. At the same time he became a valuable contributor to the literature of his profession. His first work of importance, the "Treatise on Diagnosis," published in 1817, is described by a recent authority as "comprehensive, lucid, exact, and trustworthy, having in the main stood the test of 40 years' trial." At this period also he made his researches into the effects of the loss of blood, which resulted in drawing the distinction between inflammation and irritation, and by educing practical rules for treatment and diagnosis, in revolutionizing the practice of medicine. He published various other works evincing his activity as an observer, the most important of which was the "Commentaries on various Diseases peculiar to Women" (London, 1827), which is still a standard book of reference. In 1826 he removed to London, where he prosecuted his original researches with unabated vigor. After establishing the important physiological rule that the capillary vessels are distinct in structure and function from the smallest arteries or veins, he proceeded to the discoveries concerning the nervous system which are considered the crowning act of his professional life. In the language of a writer in the

**Lancet:** "The establishment of the reflex functions of the spinal cord, in short, the whole of the excito-motor physiology of the nervous system, is the sole work of Dr. Marshall Hall. and not only this, but he has shown that there is in reality 3 great classes into which the various parts of the nervous system resolve themselves: the cerebral, or sentient-voluntary; the true spinal, or excito-motor; and the galvanic. This was the real unravelling of that perplexed and tangled web which none had before been able to accomplish. The true idea of a nervous centre could never be said to have existed before the time of Marshall Hall." Notwithstanding the importance and prospective value of these discoveries, Dr. Hall's memoirs "On the True Spinal Marrow and the Excito-Motor System of Nerves" were deemed unworthy of publication by the royal society. The principal scientific bodies of Europe and America, however, fully appreciated his services to science; and beside being chosen a foreign associate of the royal academy of medicine at Paris, he had the rare honor of an election by an almost unanimous vote into the institute of France. In 1853-'4 he visited the United States, Canada, and Cuba, and in every part of the two former countries was received with distinction by his professional brethren. One of the fruits of this tour was a work entitled "The Twofold Slavery of the United States," in which he has set forth a plan for the self-emancipation of the slaves. Among his most important and practical discoveries must be mentioned the method, now known by his name, for treating asphyxia, the superiority of which over that formerly in use has been tested by innumerable examples in many parts of the world. (See ASPHYXIA.) To the last his mental faculties were in full vigor, and only 2 months before his death he was engaged in preparing for publication in the "Lancet" a series of papers entitled "The Complete Physiology of the Nervous System." In addition to the works already mentioned, he published "Principles of the Theory and Practice of Medicine" (London, 8vo., 1887); "Observations and Suggestions in Medicine" (2 vols. 8vo.); and several important treatises on the nervous system.

HALL, ROBERT, an English preacher and author, born in Arnsby, Leicestershire (where his father was pastor of a Baptist congregation), May 2, 1764, died in Bristol, Feb. 21, 1831. He was the youngest of 14 children. At 5 years of age he was noted for a passionate fondness for reading, and would often lie for hours on the grass, with his books about him, till compelled by the shades of evening to enter the house. While still a boy his favorite works were Edwards "On the Will" and Butler's "Analogy," which he was able to analyze and intelligently discuss at 9 years of age. When 11 years old his conscientious master informed his father that he was entirely unable to keep up with his young pupil; and he was accordingly placed where he could enjoy ad-

vantages corresponding with his wonderful talents. At the age of 16 he was set apart to the office of the ministry; and, to prepare himself more fully for its work, soon entered the university of Aberdeen, where he enjoyed the teachings of Beattie and Campbell, and became the friend of Mackintosh. Of this period it is that Mackintosh tells us that he was "fascinated by the brilliancy and acumen of Hall, in love with his cordiality and ardor, and awe-struck by the transparency of his conduct and the purity of his principles," and that "from his discussions with him, he learned more as to principle than from all the books he ever read;" while Hall, on the other hand, through life reiterated the opinion that Mackintosh "possessed an intellect more analogous to that of Bacon than any person of modern times." In 1788, while still continuing his studies at Aberdeen, he became assistant pastor of Broadmead church in Bristol. Here his extraordinary powers became more and more manifest, and the church, when he preached, was crowded with the most distinguished auditors. In 1790 he removed to Cambridge, where he became successor to the Rev. Mr. Robinson in the Baptist church; and here, by his elaborate and brilliantly eloquent discourses, he rose at once to the highest rank of British preachers. His discourses were listened to by crowds, including alike professors and students; while in private life his conversation was admired and sought by the most cultivated and intelligent. In Cambridge some of his principal pamphlets were published: his "Christianity consistent with the Love of Freedom" (1791); his "Apology for the Freedom of the Press" (1798); his far-famed sermon on "Modern Infidelity" (1800); his "Reflections on War" (1802); and his "Sentiments suitable to the Present Crisis" (1808). These publications were called forth by the events of the French revolution, which sent its thrill to every village and hamlet of Great Britain; and as they were republished in repeated editions, their arguments and eloquence made a deep and lasting impression on the mind of the nation. These occasional discourses, however, prompted as they were by the political state of the country, are not to be regarded as specimens of his ordinary preaching. The latter, though marked by the same genius and eloquence, was eminently evangelical and instructive, enlarging the knowledge and quickening the faith and piety of his people, while his labors as a pastor were as unwearied as they were useful. In 1804, when at the height of his reputation, an acute disease of long standing so increased, that his mind for a time lost its balance, and he was obliged to give up his congregation at Cambridge. On his recovery he was settled in Leicester, in the same church in which the celebrated Dr. Carey had once officiated, where his reputation for ability and eloquence rose even higher than before; and he was called in 1826 to a large and flourishing church in Bristol, the scene of his early labors. Here he con-

tinued his ministry till the progress of his disease obliged him to suspend his toils. Mr. Hall was liberal in his views, and in favor of open communion. In person he was large, and of robust figure, with a countenance expressive of self-reliance and great intellectual power; his features were ordinarily calm and serious, but in his public efforts kindling, and at times "lighted up almost to a glare." He was an indefatigable student, a thorough scholar, a profound thinker, a faithful pastor, a childlike and humble Christian. No man of modern times has more steadily held the preëminence as a pulpit orator than Mr. Hall; and to no one has it been more universally conceded. Though suffering so intensely from the agony of disease, that for more than 20 years he was never able to pass an entire night in bed, and was often obliged, in a single night, to take 1,000 drops of laudanum, he never intermitted his studies or the labors of his ministry. "No man," says his physician, "ever, probably, went through more physical suffering; he was a fine example of the triumph of the higher powers of mind, exalted by religion, over the infirmities of the body." "Whoever," says Dugald Stewart, "wishes to see the English language in its perfection, must read the writings of that great divine Robert Hall. He combines the beauties of Johnson, Addison, and Burke, without their imperfections." His works, edited, with a memoir, by Olinthus Gregory, and with an estimate of his character as a preacher by John Foster, have been published both in England and America (6 vols. 8vo., London, 1881-'8).

HALL, ROBERT PLEASANTS, an American poet and lawyer, born in Chester district, S. C., Dec. 28, 1826, died in Macon, Ga., Dec. 4, 1854. In his 12th year he removed with his parents to Georgia, and was more distinguished for aptitude than diligence in his studies. He was admitted to the bar in 1848, and rapidly rose to distinction in his profession. For many years he had devoted his leisure to poetical composition, and he published in Charleston in 1848 a volume of "Poems by a South Carolinian." He removed in 1849 to Macon, Ga., where he enjoyed an eminent legal reputation till his death. His unpublished writings in prose and verse are numerous. They include a contemplative poem on "André Chénier;" a legend of the Dakotahs, entitled "Wenona;" and the "Cherokee," descriptive of the scenery of upper Georgia. A memoir, with extracts from his writings, is contained in Miller's "Bench and Bar of Georgia" (Philadelphia, 1858).

HALL, SAMUEL CARTER, an English author and journalist, born in Topsham, Devonshire, in 1800. He was called to the bar at an early age, but seems never to have practised law. Commencing his career as parliamentary reporter for the "London Times," in 1824 he established and for many years edited the "Amulet," an illustrated annual, and succeeded Campbell as editor of the "New Monthly Magazine." As an editor of illustrated books he is

favorably known by his "Book of Gems" in 3 series, and more particularly by the "Book of British Ballads," one of the most popular publications of the day. His "Baronial Halls of England" and "Ireland," the latter the joint production of himself and his wife, are replete with antiquarian and legendary lore. Mr. Hall is also the editor of the London "Art Journal," a periodical for which his good taste and industry have secured a wide circulation in England and America.—ANNA MARIA, whose family name was Fielding, wife of the preceding, and an authoress of note, born in Dublin in the early part of this century. At the age of 14 she accompanied her mother to England, and soon after was married to Samuel Carter Hall, at whose suggestion she published in 1829 her first work, "Sketches of Irish Character." To this succeeded a long list of novels, juvenile tales, sketches, and miscellaneous works, marked by a healthy moral tone and considerable taste and humor. Her delineations of Irish female character in "Lights and Shadows of Irish Life" (8 vols. 8vo., 1838), "Tales of the Irish Peasantry" (1840), and "Marian" (1840), are considered equal to those of Miss Edgeworth. In her historical romance, "The Buccaneer" (1832), she was one of the first to vindicate the character of Cromwell. She has written two successful plays, "The French Refugee," and "The Groves of Blarney." Among her most recent works are "Midsummer Eve" (1847), and "Pilgrimages to English Shrines" (1850), both contributed to the "Art Journal."

HALL, SAMUEL READ, an American clergyman and educator, born in Croydon, N. H., Oct. 27, 1795. While he was yet young, his father removed to Guildhall, Vt., and after a few years to Rumford, Me., both at that time new settlements, and offering small advantages of school instruction. After his father's death in 1814, young Hall determined to become a teacher, and commenced at Rumford. He afterward had some academical tuition, and in 1822 taught an academy at Fitchburg, Mass., and while residing there was licensed as a preacher of the Congregational denomination. Receiving soon after an appointment from the Vermont missionary society as a domestic missionary, he removed to Concord, Vt., where in 1823 he organized the first school in the United States for the training of teachers. He maintained this school till 1880, when he was chosen principal of the English department of Phillips academy, Andover. In 1829 he assisted in the formation of the American institute of instruction, of which he has been since that time an active member. In 1887 he removed on account of his health to Plymouth, N. H., and commenced a teachers' seminary there, which was largely attended, but was given up at the end of 3 years for the want of endowment. In 1840 he removed to Craftsbury, Vt., and there established a teachers' department, in connection with the academy, which he taught, wholly or partially, till 1846. He is the author of several works, the most

popular of which, his "Instructor's Manual, : Lectures on School Keeping," has passed through many editions. He now resides at Rownington, Vt.

HALLAM, HENRY, an English historical writer, born in Windsor in 1777, died in Penaburston, Kent, Jan. 21, 1859. His father was dean of Bristol, and he was educated at Eton college and the university of Oxford, where he was graduated in 1799. He pursued the study of the law, but never engaged to any extent in its practice. He was the personal and political friend of the distinguished liberal statesmen of his time, of Lords Althorp, Lansdowne, Brougham, and Russell, and Sir James Mackintosh, and was among the early contributors to the "Edinburgh Review." His articles in that journal gave him a recognized and distinguished place among the liberal and impartial thinkers and writers in England, in the first and second decades of this century. At length in 1818, being now 40 years of age, after mature preparation and laborious study, he gave to the world his first elaborate historical work. No writer of any great eminence had appeared in England, in this department, to keep up the succession of Hume, Robertson, and Gibbon. It was therefore with some appearance of a revival of studies which had been neglected for a generation, that Mr. Hallam brought before the public his "View of the State of Europe during the Middle Ages," in 2 vols. 4to. But this treatise, though a historical work, was not a history. Its professed object was not to narrate a course of events, but to exhibit, in a series of historical dissertations, a comprehensive survey of the chief subjects of interest in what are commonly called the middle ages. These subjects are, in the 1st volume, the history of France from the conquest of Clovis to the invasion of Naples by Charles VIII.; the feudal system, especially as it existed in France; the history of Italy, from the extinction of the Carolingian dynasty to the invasion of Naples by Charles VIII.; the history of Spain to the conquest of Granada; the history of Germany to the diet of Worms in 1495; the history of the Greeks and Saracens; and the history of the ecclesiastical power during the middle ages. In the 2d volume the history of the ecclesiastical power in the middle ages is continued, upon which follows the history of the constitution, under the heads of the Anglo-Saxon constitution, the Anglo-Norman constitution, and the English constitution; and the volume closes with a chapter on the state of society in Europe during the middle ages. It will be perceived, from the extensive range of his topics, all of which are treated with a profound knowledge of the facts, as well as with a spirit of enlightened and impartial criticism, that Mr. Hallam's researches have been pushed into many departments of mediæval history, and that no ordinary skill was required to condense the result into two volumes. A work of this kind necessarily wants what may be called the epic attraction of a great historical composition in

the ordinary sense of the words; but for the philosophical student it has its counterbalancing advantages. The endless detail of facts in a work like Gibbon's, however skilfully narrated, is wearisome at the time, and soon escapes the memory. General results, institutions, prominent characters, and great events, are all that the ordinary powers of recollection can retain; and these are clearly stated and fully illustrated by Mr. Hallam. He does not equal either of the three great historians of the last century in style; but his learning is more select and critical than Gibbon's; his facts are more to be relied on and his judgment more impartial than Hume's; and in all the qualities of a historical writer of the first class, with the exception perhaps of the easy flow of language, he excels Robertson. Mr. Hallam modestly states that he had more in view the instruction of the young than the improvement of mature readers. This work rose at once to the rank of a standard treatise, and after a lapse of 30 years a supplemental volume was published by Mr. Hallam, presenting in a series of annotations the result of his studies since its first appearance, with the advantage of the labors of the great French historical writers who had appeared in the interval, Sismondi, Michelet, and Guizot, with their associates of somewhat lower though highly respectable rank, Thierry, Fauriel, and Raynouard. His obligations to several historical writers in England, or writers illustrating historical subjects—Sir Francis Palgrave, Allen, Kemble, Spence, Starkie, Nicolas, and Wright—are also acknowledged. A just and beautiful compliment is also paid by Mr. Hallam, in the preface to this supplemental volume, to M. Guizot. After an interval of 9 years, Mr. Hallam published his second great work, "The Constitutional History of England from the Accession of Henry VII. to the Death of George II." (2 vols. 4to., 1827). This work takes up the history of the British constitution where it was left in the 8th chapter of the "History of the Middle Ages." It was originally his intention to carry on the whole of this last named work, from the point where he left it, down to about the middle of the last century. Finding that this would be an enterprise of unwieldy dimensions and of labor beyond his strength, he satisfied himself with a continuation of the history of the constitution of his own country. He gives, however, a wide comprehension to the subject, making it include the establishment of the English church and the proceedings of the state with reference to dissenters. The work also contains two supplemental chapters on Scotland and Ireland. Mr. Hallam remarks, in reference to the general character of his work, that the "constitutional and general history of England at some periods necessarily coincide;" and this is peculiarly the case in regard to the reformation and the civil wars, which are treated in the most important chapters of this work. This second work of Mr. Hallam possessed the characteristic merits of the first, patience of research,

accuracy of statement, and firm attachment to liberal principles, united however with moderation and impartiality in the judgment of character and estimate of measures. But it covered a period nearer to our own times, and touched the roots of existing controversies; it did not therefore command the same general assent, in reference to the statement of facts and the assertion of principles. It was attacked by Mr. Southey in the "Quarterly Review" as the work of a "decided partisan;" but this was a judgment which confuted itself—a party judgment from a decided partisan. Mr. Southey's laborious disparagement and attempted impeachment of the historical faith of Mr. Hallam were followed in a few months, in the "Edinburgh Review," by one of the most brilliant productions of the most brilliant writer of the age, who says: "On a general survey, we do not scruple to pronounce the 'Constitutional History' to be the most impartial book we ever read." This testimony from Lord Macaulay is the more valuable because, in the article referred to, he expresses his dissent from Mr. Hallam on several points of prime importance in English constitutional history. Mr. Hallam himself says, with a noble consciousness of impartiality, that no one will suspect him of being a "blind zealot;" and the adverse judgment to which we have alluded has not been confirmed by the verdict of the enlightened public either in England or America. Thirty years have elapsed since the "Constitutional History" was published, and opinion has been more and more settling down upon the general views which Mr. Hallam has taken on most questions. There is no doubt that his treatise had a considerable effect in discrediting the theoretical Toryism, which had appeared in its most attractive form, as far as English history is concerned, in Hume. The great reform in parliament, which took place 30 years ago, was no doubt facilitated by the popularity of Mr. Hallam's work; and it is probably viewed, at the present day, as in the main an accurate deduction and a fair statement of the principles of the British constitution. After another interval of 10 or 12 years, Mr. Hallam published his third and last great work, the "Introduction to the Literature of Europe in the 15th, 16th, and 17th Centuries" (4 vols. 8vo., 1837-'9). This was prepared under the cloud of sorrow which gathered over his house, in consequence of the death of his eldest son, a young man of the brightest promise. Perhaps it is partly to this bereavement that he refers when he remarks in his introduction: "I have other warnings to bind up my sheaves while I may—my own advancing years, and the gathering in the heavens." The preface to this work contains a comprehensive survey of what had been done before his time in the same department of letters, and sufficiently establishes his claim to have led the way among English writers in a general survey of literary history. The principal writings of his predecessors on the continent are enumerated and fairly criticized. The book

itself is one of too great compass and variety to be executed in all its parts with equal ability. It is, however, a work of original research, conscientiously pursued. Mr. Hallam states in the preface that, as far as he recollects, he has "quoted no passage which he has not seen in its own place," in the author from which it is cited. "Without censuring those," he adds, "who suppress the immediate source of their quotations, I may justly say that in nothing I have given to the public has it been practised by myself." Impartiality, good sense, correct taste, freedom from extravagance, and a clear and expressive though not very flexible or attractive style, characterize this, as they do all Mr. Hallam's writings. We are unable to present the reader with many details of Mr. Hallam's personal history. We have already remarked that, though educated to the law, he did not engage in its practice. He attached importance, and justly, to his legal training as a qualification for writing a history of the constitution, and comments on Hume's deficiency in this respect, treating his great predecessor, however, with commendable respect, considering the difference of their political systems. In his family relations he was at once the happiest and the unhappiest of men; the happiest in being the father of two sons of rare endowments, exemplary character, and the brightest hopes; the unhappiest in being called to part with them both in the morning of their days. Arthur died in 1838, at the age of 22. Henry, on whom the father's affections were concentrated with increased warmth after the loss of his brother, died in 1850, aged 26. When Sir Robert Peel tendered to Mr. Hallam the heritable title of baronet—the highest ever conferred on a man of letters in England till Mr. Macaulay was raised to the peerage—Mr. Hallam said he would be governed by his son's wishes. Henry, on being consulted, said that he was content to be known as the son of Henry Hallam, to whom no title could add dignity. Mr. Hallam received the degree of D.C.L. from the university of Oxford in 1848, and that of LL.D. from Harvard college the same year. In his letter acknowledging his American diploma, he says: "The admiration of literary merit (and I must not now be understood as referring to myself) has become of late years very characteristic of America. It displays itself with a noble, and we may say juvenile enthusiasm, which we are far from equalling in Europe." An edition of Mr. Hallam's historical works appeared in London in 1865-'6, in 9 vols. 8vo.—ARTHUR HENRY, son of the preceding, born in London, Feb. 1, 1811, died in Germany, Sept. 15, 1833. He studied at Eton and at Trinity college, Cambridge, took his degree in 1832, and in the same year was entered of the Inner Temple, and became a student in the office of a London conveyancer. In Aug. 1833, he accompanied his father to the continent, where he contracted a slight illness which brought a chronic disorder to a fatal termin-

tion. He was a young man of superior and cultivated mental powers, and left a number of poems and prose writings, which were collected by his father and printed with a memoir for private circulation (London, 1834). His biographical sketches of Petrarch, Voltaire, and Burke, contributed to the "Gallery of Portraits" of the society for the diffusion of useful knowledge, and "Remarks" on Rossetti's *Disquisitioni sullo spirito antipapale* (1832), appeared anonymously during his lifetime. Mr. Hallam was betrothed to a sister of the poet Tennyson, who commemorates the death of his friend in his "In Memoriam."

HALLE, a city of Prussian Saxony, in the governmental district of Merseburg, distinguished from other places of the same name by the addition *an der Saale*, situated on the right bank of the Saale and on some of its islets; pop. about 35,000. It consists of Halle proper with 5 suburbs, and of the two ancient towns of Glaucha and Neumark. The streets, except in some modern parts, are generally crooked, narrow, and badly paved. The principal public buildings are the church of St. Mary, with 4 towers, built in the Gothic style about the middle of the 16th century, to which a library of 20,000 volumes and the so called red tower on the market place belong; that of St. Maurice, also built in the Gothic style, and that of St. Ulrich; the cathedral, the city hall, the ruins of the castle of Moritzburg, anciently a residence of the archbishops of Magdeburg, the university, and the Francke institutions in the suburb of Glaucha, containing the bronze statue of their founder. Halle is particularly celebrated for its various educational and other institutions, as well as scientific societies. The university, which was founded in 1694 by Frederic I., and united in 1815, after having been closed by Napoleon in 1806 and 1813, with that of Wittenberg, was most flourishing in the beginning of this century, and shows on the list of its professors the names of Francke, Lange, Semler, Niemeyer, Gesenius, Tholuck, Müller, Guericke, Herzog, Götschen, Witte, Hencke, Wolf, Eberhard, Ersch, Gruber, Michaelis, Vater, Wahl, Gerlach, Leo, Prutz, Eiselen, and others. It is attended now by about 700 students under more than 60 academical teachers, and has a normal, philological, and theological seminary, an academy of the natural sciences, a medical and surgical clinical institute, a school of midwifery, an anatomical theatre, a botanical garden, an observatory, and a library of over 60,000 volumes. The Francke institutions comprise an orphan asylum, several schools, and a printing press. Halle has manufactories of woollen and linen goods, stockings, gloves, silk buttons, hardware, leather, and starch, the last being the most important, and an active commerce favored by the railway lines which connect it with Magdeburg, Berlin, Leipzig, Dresden, and other places, and by the navigation on the Saale. The annual produce of the salt works is about 260,000 cwt.; those in the city belong to a company, and those

out of it to the government. The *Hallören*, who are mostly engaged in the neighboring salt mines, are believed to be the descendants of the Wendish Slavia; according to others they are of Celtic origin. In the vicinity of the city are the village and castle of Giebichenstein, and a monument erected in commemoration of the Germans who fell in the battle of Leipsic. Halle is first mentioned, as the castle of Halla, under Charlemagne. Otho the Great gave it to the archbishop of Magdeburg, and Otho II. erected it into a city in 981. It became so powerful in the course of time as to contend in the 13th century, often successfully, with its feudal lords, and to resist in 1435 a large army under the elector of Saxony. The reformation was introduced here in its earliest period. The city suffered greatly during the 80 years' war, and came in 1648 into the possession of the house of Brandenburg by the peace of Westphalia. Handel, the great composer, was a native of Halle, and a monument was dedicated to him there in 1859. The *Hallische Zeitung*, the *Neue Hallische Zeitung*, and several scientific periodicals, are published in Halle.

HALLECK, FRITZ GREKNE, an American poet, born in Guilford, Conn., July 8, 1795. His mother, Mary Eliot of Guilford, was a descendant of John Eliot, the "apostle of the Indians." At the age of 18 he became a clerk in the banking house of Jacob Barker in New York, in which employment he remained for many years. He was also, as he informs us in one of his poetical epistles, "in the cotton trade and sugar line." For a long period previous to the death of John Jacob Astor he was engaged in his business affairs, and was named by him one of the original trustees of the Astor library, a position which he still holds. Since 1849 he has retired from commercial and financial pursuits, and now resides chiefly in his native place. Mr. Halleck wrote verses in his boyhood, some of which, it is said, found their way into the columns of contemporary newspapers; but few of these early effusions have been preserved, and none have been deemed by him worthy of insertion in the collected editions of his poems. His lines to "Twilight," the earliest in date of his collected poems, appeared in the "New York Evening Post" in 1818, and in the succeeding March he assisted Joseph Rodman Drake in contributing the humorous series of "Croaker" papers, then recently commenced by the latter, to the columns of the same journal. Halleck's contributions, originally signed "Croaker, jr.," and subsequently "Croaker and co.," were discontinued after July, 1819, his coadjutor having been compelled by ill health to retire from the undertaking in the previous May. His death in the succeeding year was commemorated by Halleck in one of his most touching poems. In the latter part of 1819 Halleck wrote his longest poem, "Fanny," an amusing satire, in the measure of Byron's "Don Juan," on the fashions, follies, and public characters of the day. It was completed

and printed within 8 weeks of its commencement, and from the variety and pungency of the local and personal allusions enjoyed a great popularity, copies having been circulated in manuscript after the original edition, which was not immediately republished in America, had been exhausted. The authorship of this production, as well as of the "Croaker" papers, was for a long time unacknowledged, although the former and several specimens of the latter are now included in the published editions of Halleck's poems. In 1822-'8 he visited Europe, and in 1827 published an edition of his poems in one volume, two of the finest in the collection, "Alnwick Castle" and "Burns," having been suggested by scenes and incidents of foreign travel. This edition also included the spirited lyric "Marco Bozzaris," originally published in the "New York Review," to which he was an occasional contributor. Enlarged editions have repeatedly appeared since then, those of 1858 (1 vol. 8vo., and 1 vol. 12mo., illustrated) being the latest. His reputation, however, rests mainly upon the few pieces published in his earliest volume, which have probably been more widely read and appreciated than the productions of any of the older American poets who have written so little. In New York and its neighborhood his verses were long cherished above those of any of his countrymen, and throughout the United States "Marco Bozzaris" is still one of the most popular poems in the language. A remarkable characteristic of his poetic genius is its versatility, the 82 pieces which comprise his collected poems containing specimens of delicate local satire, of elegiac or contemplative verse, of martial lyrics, and of animated narrative or playful humor, each excellent in its kind. His versification is easy and harmonious, and, according to the testimony of one of the most eminent of his contemporaries, "in no poet can be found passages which flow with more sweet and liquid smoothness." He is greatly esteemed in private life, and his manners and conversation reflect the genial humor so frequently discernible in his poems.

HALLER, ALBRECHT VON, one of the most learned men of the 18th century, born in Bern, Oct. 16, 1708, died there, Dec. 12, 1777. A member of an eminent patrician family of Switzerland, he received an excellent education, studied theology at the university of Tübingen, and medicine and natural sciences under Boerhaave and other professors at Leyden, where he was graduated in 1726. After having paid a lengthened visit to England and France, he devoted himself for some time in Basel to the study of the higher branches of mathematics under Bernoulli. His delicate health induced him to accompany his friend Johann Gessner on a tour through the Alps, where he gathered the materials afterward developed in his great botanical work, and in his poem on the Alps. In 1729 he returned to Bern, where he soon gained a high reputation as a physician, and founded

an anatomical theatre. In 1735 he was appointed physician of the city hospital and director of the city library, and in the following year professor of botany, medicine, surgery, and anatomy at the newly established university of Göttingen. He founded there an anatomical theatre in 1738, a botanical garden and an anatomical museum in 1739, a lying-in asylum and the royal academy of sciences in 1750, and became president for life of the latter institution, which was opened in the following year. He was ennobled by the emperor Francis I., received complimentary invitations from the faculties of Oxford, Utrecht, Halle, Berlin, and St. Petersburg, was appointed royal councillor and physician by the king of England, and member of the grand council by his native city. In 1753 he relinquished all his trusts, excepting the presidency of the royal academy, and spent the rest of his life in study in Bern, where he became chief magistrate.—Haller is regarded as the father of modern physiology. He founded his system on a thorough knowledge of anatomy and established scientifically a new law, by which he referred the animal functions almost exclusively to two powers, irritability and sensibility. He had evolved this idea as early as 1739, and announced it in 1747, in his *Prima Linea Physiologia*, and expounded his system in its entire comprehensiveness in his great work, *Elementa Physiologiae Corporis Humani* (Lausanne, 1757-'66, with a posthumous supplement, 1782), which is as celebrated for the elegance of its style as for the importance of its scientific revelations. Among his most useful and laborious works are his *Bibliotheca Botanica* (Zürich, 1771-'3), *Bibliotheca Chirurgica* (1774-'5), *Bibliotheca Anatomica* (1774-'5), and the first part of the *Bibliotheca Medicinæ Practicæ* (Basel, 1776-'88). His *Icones Anatomicae*, which he himself regarded as one of his best works, contains 46 plates, presenting drawings of many of the organs, more particularly of the arteries. His writings and teachings exercised more influence upon the development of physiological as well as medical and botanical science, than those of any other savant of the 18th century. His literary activity was prodigious. Beside numerous contributions to German and French scientific periodicals, he wrote no fewer than 12,000 reviews for the *Commentarii Societatis Regiæ Scientiarum Göttingensis*, and many novels and descriptive and didactic poems. His best poems are the "Alps," and "On the Origin of Evil." Schlosser, in his "History of the 18th Century," says of them: "They teach an admirable philosophy, which springs not from books or universities, but from the mind and deepest and holiest conviction of the poet." The same historian says of his scientific labors: "His system, his hypotheses, his bold glances, his conclusions with respect to the connection of phenomena, although they have seldom withstood the examination of later inquirers, nevertheless throw a light upon nature, life, and organization, and the constitution of

ings, by which the obscurity of the middle ages was dissipated, theology entirely excluded from the science of nature, and the whole life of man enlightened."—KARL LUDWIG VON, a grandson of the preceding, born in Bern, Aug. 1, 1768, died in Solenne, May 20, 1854. He created some sensation in the religious world by his secession from Protestantism, and gained a high reputation in the Roman Catholic church, to which he confessed his spiritual allegiance, by his literary abilities. He held at various times offices in the public service of Switzerland and France, was also for some time professor of history and statistics at Bern, and secretary to the archduke Charles of Austria. Having lost the offices which he had held in France after the revolution of 1830, he returned to his native country, and was at the time of his death one of the leaders of the ultramontane party. His principal work, *Restauration der Staatswissenschaften*, has been translated into several languages, and partly into French by himself.

HALLEY, EDMUND, LL.D., an English philosopher, born in Haggerston, near London, Oct. 29, 1656, died in Lee, near Greenwich, Jan. 14, 1742. Even while a school boy, he made observations on the variation of the magnetic needle, and at Queen's college, Oxford, devoted himself almost exclusively to astronomy and mathematics. His first published essay was "A Direct and Geometrical Method of finding the Aphelia and Eccentricity of Planets" (1675). In Nov. 1676, he sailed under the patronage of Charles II. and the East India company for St. Helena, to form a catalogue of the fixed stars of the southern hemisphere; he returned in 1678, and the next year published his *Catalogus Stellarum Australium*, containing the positions of 360 stars, and numerous other interesting observations. In 1678 he was elected a fellow of the royal society, and in 1679, at the request of that society, went to Dantzic, to settle an important astronomical controversy between Hooke and Hevelius. In 1681 he set out on a continental tour, and in December, when near Paris, he discovered that remarkable comet, known by his name, first seen a month before and then lost, which soon afterward attracted the attention of Europe; his prediction of its return was the first of the kind that proved correct. In 1683 he published his "Theory of the Variation of the Magnetic Compass," in which he considers the earth as a vast magnet, having 4 magnetic poles, 2 near its N. and 2 near its S. pole, the needle always being governed by the nearest. In the same year he was led to examine Kepler's laws of the planetary motions, and from them first to infer that the centripetal force always varies inversely as the square of the distance; and on visiting Newton at Cambridge, to obtain aid in proving this geometrically, he was delighted to find that the latter had perfectly demonstrated the laws of the celestial motions. He soon gave the royal society an account of Newton's treatise *De Motu*, which was entered on their register; and at a

later period he prevailed on the great philosopher to complete his *Principia*, the first volume of which was exhibited to the society, April 20, 1686, and was printed by Halley at his own expense. In 1686 he published an account of the trade winds and monsoons near the tropics; and among other valuable papers was one in 1691 on the circulation of watery vapors and the origin of springs, in which he was the first to point out that wonderful provision of nature by which a constant circulation of water is kept up between the air and the ocean; and another, showing the importance of observing the conjunctions of the superior planets, as a means of determining the sun's parallax and distance from the earth. In the same year he was a candidate for the Savilian chair of astronomy at Oxford, but failed to obtain it mainly on account of what were regarded as his infidel opinions, though it is now said that the only ground for this charge was, that he asserted the existence of a pre-Adamite earth, out of the ruins of which our present earth was made. In 1692 he published his modified theory of the changes in the magnetic variation, and to test its correctness by observation, obtained from King William the appointment of captain to a vessel, in which in two successive voyages he finished his experiments; returning home in 1700, he published his chart of the compass variations, and received the title of captain in the royal navy, with half pay for life. On the recommendation of Queen Anne, and at the request of the emperor of Germany, he went twice to the Adriatic to plan the formation of a harbor. In 1708, on the death of Dr. Wallis, he was chosen Savilian professor of astronomy at Oxford, and the university conferred on him the honorary title of LL.D. Soon after he began, with Gregory, the publication of the works of the ancient geometers, and several of their treatises, translated and edited by them, appeared in 1706-'10. In 1718 he was elected secretary of the royal society, having previously been assistant secretary, and editor of its "Transactions" from 1685 to 1692. Soon after he made valuable experiments with the diving bell, which were published in 1716. In 1720, after the death of Flamsteed, he was appointed astronomer royal; and though now 64 years of age, he continued for 20 years, without an assistant, to carry on the operations of the Greenwich observatory with unremitting diligence. In 1721 he published his method of finding the longitude at sea; and in 1725 drew up his tables for computing the places of the planets, which, however, as he delayed publishing that he might perfect them, did not appear till 1749, after his death. In 1729 he was elected a foreign member of the academy of sciences in Paris; and in 1737 he was struck with paralysis, which gradually gained upon him till his death. M. Mairan, who prepared the eulogy of Halley read to the academy of sciences in 1742, says of him: "While we thought the eulogium of an astronomer, a naturalist, a scholar, and a philosopher comprehended



our whole subject, we have been insensibly surprised with the history of an excellent mariner, an illustrious traveller, an able engineer, and almost a statesman."

**HALLIWELL, JAMES ORCHARD**, an English archæologist and author, born in Chelsea, June 21, 1820. Many rare and curious works illustrating British literary history and antiquities have been brought out under his supervision, and he is favorably known to Shakespearean scholars as the author of more than 20 original papers and elaborate works on the writings of the great dramatist. In 1848 he published a "Life of William Shakespeare" (8vo.). Of his other original works the most important are an "Early History of Free Masonry in England" (8vo., 2d ed. 1844), and "Dictionary of Archaic and Provincial Words" (3 vols. 8vo., 1846, 8d ed. 1855). His publications, original and otherwise, probably amount to upward of 60 in number. For the last 5 years he has given his exclusive attention to a folio edition in 30 volumes of Shakespeare's works, to be published by private subscription at £3 3s. the volume, containing new collations of the early editions and the novels and tales on which the plays are founded, with illustrations by Mr. F. W. Fairholt, and a life of the poet. Of this work but 150 copies will be printed.

**HALLOCK, JEREMIAH**, an American clergyman, born in Brookhaven, L. I., March 18, 1758, died in West Simsbury, Conn., June 23, 1836. When he was 8 years old his father removed to Goshen, Mass.; and before he was 21 he was twice called to enter the army of the revolution. At the age of 21 he became the subject of deep religious impressions; and soon after this, as he was called to do military duty, he and his fellow soldiers having entered a barn, he "found himself surrounded by his young companions and others, exhorting them on the subject of religion." He afterward devoted himself to the ministry, and became one of the earliest and most successful laborers in the great revival near the beginning of the 19th century. He soon entered the school of Dr. Dwight, late president of Yale college, who was then teaching at Northampton, Mass.; and finally, in April, 1784, he was licensed to preach by the Berkshire association. While he was studying theology at West Simsbury, a revival of religion took place there, in which he labored with great activity; and for the two succeeding years he was engaged in conducting similar exercises in other towns, especially at Goshen and Ware, Mass. It was his wish to spend his life as an itinerant minister; but he at length yielded to the importunity of the congregation in West Simsbury, and was installed their pastor, Oct. 26, 1785, where he remained until his death. His life has been written by the Rev. Cyrus Yale.—**MOSES**, an American clergyman, brother of the preceding, born in Brookhaven, L. I., Feb. 16, 1760, died July 17, 1837. He was graduated at Yale college in 1788, and installed first pastor of the church in

Plainfield, Mass., July 11, 1792, where he ministered until his death. He was a man of patriarchal simplicity, and devoted himself to the education of young men for the ministry, in carrying out which object he submitted to the severest personal deprivations. Among the 554 pupils whom he instructed were the Rev. Messrs. James Richards, missionary to Ceylon; William Richards, missionary to the Sandwich islands; Levi Parsons and Pliny Flak, missionaries to Palestine; Jonas King, missionary to Greece; and Bela B. Edwards, professor of biblical literature in Andover theological seminary. A sketch of his life and character, with extracts from his correspondence, has been published by the American tract society.—**GERARD**, an American journalist, son of the preceding, born in Plainfield, Mass., March 18, 1800. He was graduated at Amherst college in 1819, and established in 1824 the "Boston Telegraph," a weekly journal, which he united with the "Boston Recorder" in 1825. He became half proprietor of the "New York Observer" in 1827, and in partnership with David Hale became proprietor of the New York "Journal of Commerce" in 1828, which paper he has continued to conduct until the present time. In early life he was an admirable classical scholar, thoroughly acquainted with Hebrew, in which language he gave lessons to many clergymen. He was also acquainted with several modern languages, and at one time taught German. In 1828 Messrs. Hale and Hallock fitted out a schooner to cruise off Sandy Hook and intercept European vessels for news, an example that was speedily followed by other journals. In 1833 they established a horse express from Philadelphia to New York with 8 relays of horses, by which they were enabled to publish congressional news one day in advance of their contemporaries. This example was also followed, and the government itself then established the express, whereupon the "Journal of Commerce" extended its relays of horses to Washington. In one instance the "Norfolk Beacon" (Va.) published the Washington news, received by steamer from the "Journal of Commerce," for two successive days, before they received it from Washington direct. This was the origin of a system of expressing news by the use of horses, steamers, and railway engines, which culminated in the celebrated Halifax express, by which for a long time the European news was regularly brought from that port to New York by horse, steamer across the bay of Fundy, and rail and steamer thence to New York city. The "Journal of Commerce," under Mr. Hallock's charge, has not been neutral in politics, but has taken a strong position on one or the other side of almost every question, usually being found on the so called democratic side, although it supported Gen. Taylor for the presidency. Mr. Hallock has been the means of purchasing the freedom of a very large number of slaves. He has expended more than \$50,000 in the erection and support of a church in New Haven, where he

resides; and by personal exertions he founded the southern aid society, designed to take the place of the American home missionary society at the South, when the latter withdrew support from slaveholding churches.

**HALLOW EVE.** See **ALL-HALLOWES**.

**HALLOWELL**, a city of Kennebec co., Me., on the W. bank of the Kennebec river, and on the Kennebec and Portland railroad, 2 m. below Augusta, and 4 m. above Gardiner; pop. in 1850, 4,769, since which time it has been reduced about one third by the formation of the townships of Chelsea, Manchester, and Farmingdale. It is built on rising ground, the principal avenues running parallel to the river, and the cross streets having an ascent of about 200 feet from the water's edge to the crest of the hill. The upper part of the city is occupied by residences, the lower by stores, factories, and warehouses. There are 3 ship yards, 2 brick yards, a steam saw mill, 2 machine shops, 2 tanneries, 2 manufacturing of oil cloth, 2 of whitening, &c., 1 cotton mill, 2 banks with an aggregate capital of \$150,000, an academy, 10 schools, and 5 churches (Baptist, Congregational, Methodist, Unitarian, and Universalist). The valuation of property in 1858 was \$1,225,510. Hallowell is at the head of ocean steamboat navigation, and the wharves are accessible by vessels of 9 feet draught. A fine bridge extends across the river to Chelsea. Hallowell was permanently settled soon after the erection of Fort Western in 1754 on the site of the present city, although a few traders or colonists resided there a century earlier. It was incorporated as a township in 1771, and received a city charter Aug. 29, 1850. It derived importance from a quarry of very fine granite in that part of its territory which is now the town of Manchester.

**HALOS**, luminous rings which, in distinction from the rainbow and fog-bow, are formed about, and not opposite to the sun or other luminaries, or about the shadow of the observer's head. Rings white or colored, the colors usually more feeble than those of the rainbow, and sometimes scarcely perceptible, are, under certain conditions of the atmosphere, seen about the sun, moon, brighter stars or planets, or even artificial lights. They are usually concentric with the luminary giving rise to them, but sometimes take this into their circumference, or occupy other relations, mostly symmetrical in some way, with its place. Their diameters have been found to be various, between 3° and 90° or 94°, in rare instances 180°; but tending, in each form, to fall within certain limits, or to appear at or near a given angle. Thus, of one class the diameters range commonly between 3° and 18°; another class occur most frequently with radii of 22½°, 45°, and 90°. Adding the rarer mock luminaries, and the colored rings about the shadow of the observer's head, we have all the cases (in the naming of which there has been some unnecessary confusion), naturally arranging themselves under 4 distinct heads. 1. Halos proper. In the commoner forms, one or two rings, formed

in the thin, feathery cloud overspreading the sky at a great height, extend vertically about the sun or moon. The diameters of these vary somewhat, and sometimes during the same display; but when one only is seen, its distance from the sun is very near 22½°, or diameter 45°; the latter number being also the radius or distance of the second, when seen. Of these rings, the color of the inner border, when obvious, is almost universally red; next to this comes green or blue; the outer edge is one of the latter colors, violet, or white. Very rarely the outer border is red. The breadth is usually slightly less than that of the luminary; sometimes a ring appears as if made up of two lying side by side, and crossing each other in very acute angles at certain points of their course. As in the rainbow, the red border is most defined, the opposite being lost in a diffused light; and the sky just within these rings usually appears more dark than elsewhere. The 3d and largest ring, having a radius of about 90°, is usually white; but it is seldom or never complete, even in the visible portion of sky. The same obvious atmospheric conditions that show these more ordinary forms, may also give rise to a white circle having the breadth of the solar disk, through which it passes, and extending completely around the sky in a plane parallel with the horizon. A second white band of the same breadth may pass through the sun's disk in a vertical direction, while at the points in which this intersects the two ordinary rings above, tangent colored arcs may be seen curving away from the rings respectively, and tending to include the zenith. 2. Parhelia, and paraselenæ. A parheliion is an attendant image, more or less distinct, of the sun's disk, which may appear with any halo, at one, two, or more points near the sun; but which is more frequently formed in the course of the horizontal or vertical white bands, or in both, at or slightly without the intersection of these with the ordinary halos. Parhelia show the usual colors of halos, in the same order, but more brightly, and even when the latter are not perceptibly colored. They seldom appear at once at more than 3 or 4 of the intersections; and they sometimes present a sort of tail lying in the direction opposite the luminary. Popularly, they are known as sun dogs, or mock suns. The corresponding appearances about the moon are termed paraselenæ. The more complicated phenomenon, showing both the halos and mock luminaries, although somewhat rare, is still much varied in form. Among the earlier clearly recorded observations may be named an example of the solar, observed by Scheiner at Rome in 1629; and of the lunar, by Hevelius of Dantzic in 1660. Very brilliant halos were seen about the sun for several days in succession at Moscow, in 1812, during its occupancy by the French; the most splendid instance on record occurred at Gotha, May 12, 1824. 3. Coronæ, colored circles, 1, 2, or 3, immediately surrounding the apparent place of the luminary, whether this be the sun,

moon, a bright planet or fixed star, or an artificial light. In any of the lower forms of cloud, partially obscuring the source of light, the corona sometimes appears as a luminous circle or patch of cloud. The colors are usually more lively than those of halos, forming about Sirius or Jupiter rings of  $8^\circ$ ,  $4^\circ$ , and  $5^\circ$  diameter; around the moon,  $8^\circ$  and  $5^\circ$ , or like those about the sun, which are more frequently near to  $6^\circ$ ,  $9^\circ$ , and  $12^\circ$ ; and in all of them the ratio of diameters is in some part of the natural series of numbers, 1, 2, 3, 4, &c. The breadth of the inner ring may vary from  $2^\circ$  to  $4^\circ$ ; but the second is double this, and so on. The colors are the reverse of those of halos; the 1st ring being within blue, then white, and then red; the 2d, purple, blue, green, and red; the 3d, pale blue and pale red. These colored rings are extremely frequent in Holland, Italy, and Spain; and near the equator they are common about the planet Venus. 4. Anthelia, or "glories," colored rings about the shadow of one's own head, when, in elevated situations, this falls on near clouds that lie opposite the sun; or, in the polar regions, very commonly when the shadow is cast horizontally upon a fog; or less perfectly, in lower latitudes, at sunrise, upon grass covered with dew. Bouguer first observed this among the Andes; he and several companions seeing each his own head only encircled with 8 colored rings—diameters,  $5\frac{1}{2}^\circ$ ,  $11^\circ$ , and  $17^\circ$ . Lamartine saw this phenomenon when on the summit of Lebanon; and it has been observed by many others. The colors have the same general order as in coronas, the red border being outermost. A 4th colored ring, the "circle of Ulloa," is seldom complete.—Some further facts will be in place before seeking the causes of these phenomena. In high northern latitudes, halos and parhelia are very frequent; Capt. Parry always saw the former about the time of full moon. But whether in higher or lower latitudes, they are only seen when there intervene between the luminary and the observer those highest thread-like forms of cloud, the cirrus or cirro-stratus. The cold prevailing in the elevated regions occupied by these clouds renders it quite certain that their particles must be in the frozen condition—a fine ice mist—such as we experience in the coldest days of winter, and which, driven against the face by a wind, actually prick the skin. These crystals incline chiefly to the form of hexagonal prisms; and to refraction and decomposition of light passing through certain angles of these, Marriotte was led to ascribe the production of halos. For any refracting angle of a prism there exists a minimum angle of deviation, dependent on the density and the angle. Now, the minimum deviation of a decomposed ray occurs when the angle of refraction is just half the refracting angle of the prism used. The refracting angle of the ice prisms being  $60^\circ$ , the angle of refraction giving the least deviation for the red ray from the original course of the light must be  $30^\circ$ , and, the refractive index of ice being 1.31,

the angle of incidence must be  $41^\circ$ . Then, the deviation being equal to twice this angle less the refracting angle, or  $2 \times 41^\circ - 60^\circ = 22^\circ$ , a result very closely agreeing with that of observation for the smallest and most common form of halo. To produce this ring, then, it is only necessary to imagine the minute prisms of ice floating or descending through the air in all positions, but, owing to the resistance presented by the air to the action of their weight, taking especially horizontal and vertical directions; then, near to the position giving a minimum deviation of the transmitted rays, a considerable turning of the crystal about its axis gives only an insignificant change in the direction of the emergent light; and hence, a far larger number of the crystals will transmit red rays deviating from their previous rectilinear course by exactly or nearly this angle of  $22^\circ$ , than by any other. The rays from the sun or moon being in effect parallel, there should, at nearly this angle with the luminary, be seen, therefore, a dim circle, red and defined within, but beyond this having the colors overlapping one another, and indistinctly seen or resulting in white. The halo of  $90^\circ$  or  $92^\circ$  may be accounted for by the refraction occurring through the angles of  $90^\circ$  at which the sides of the ice prisms meet their bases, the minimum deviation for red in this case being about  $45^\circ$ . The partial polarization of the light in a plane tangent to the ring shows it to be refracted light; that of the rainbow being polarized in a plane normal to the circle, and mainly due to reflection. Muschenbroek saw large colored halos about the moon, by looking through plates of ice formed on the panes of his window. The white horizontal and vertical bands can be explained by reflection from the vertical faces of crystals, descending in a calm air and in all possible azimuths. The parhelia may be considered as being the intensified effect at certain points of a greater condensation of the dispersed rays at the angles of minimum dispersion; so that they are to the halo what the halo itself is to the diffused light thrown on the surrounding cloud. The fact that they are usually a little without the rings has been supposed due to the greater obliquity of the crystals, at the points where they appear, to the plane of refraction. But while the explanation of these simpler parts is quite satisfactory, that of the more complicate and peculiar phenomena becomes extremely difficult; and we can only in a general way refer these to the variety of changes, including reflection, and simple and double refraction, of which light is capable, and to the probable effects of extraordinary forms and combinations of the crystals. If the views taken of the phenomenon be correct, then, by consequence, halos prove what is the temperature of the highest cloud region, and the condition of cloud occupying it. Certain it is that they are closely connected with peculiar meteorological changes; and that, occurring in summer, they indicate rain, and it has been said wind, while in winter they precede snow, or it

may be also frosts.—The explanation of coronæ and anthelia is quite distinct, and more simple. These are never seen upon the cirrus or ice cloud, but upon any form of vesicular cloud, more or less transparent. Very complete coronæ are seen about a candle flame viewed through condensing steam, or through a glass finely dewed, or dusted with lycopodium; and the writer has frequently seen these rings about the flame of a lamp viewed upon arising from sleep in the night, when the cornea may be supposed to be unusually filmed over with moisture, or the air to contain condensed vapor. Obviously, then, as explained by Young, the rings of coronæ, the colors of which are those of the reflected series in thin plates, are fringes due to interference of rays which have undergone diffraction by grazing on either side of numerous minute globules of cloud or fog, that have for the time nearly the same size. (See DIFFRACTION.) An illustrative instance was first given by Necker of Geneva. When the sun rises behind a hill covered with trees or brushwood, a spectator in the shadow of the hill sees all the small branches that are nearly in the line of the solar rays, on either side, projected on the sky, not black and opaque, but white and brilliant, as if of silver, the effect of a small opaque body on the light being, in this class of cases, equivalent to that of a small opening in a dark body through which the rays should penetrate. Coronæ exist around the sun more frequently than would be supposed; but they are often not observed, on account of the brilliancy of that orb. At such times they may be detected by looking at the reflection of the sun in still water, or in black glass. Anthelia are explained upon the same principle as coronæ, with the single exception that the diffraction in this instance does not occur during the direct transmission of the solar beams through the cloud, but during the retrograde transmission of rays which, having penetrated to considerable depth in the cloud, undergo reflection, and are then diffracted by nearer globules while on their return to the eye. It has been estimated that, in the middle latitudes of North America, halos and coronæ are visible at least as often as twice weekly by day, and twice monthly by night.

HALYBURTON, THOMAS, a Scottish divine, born in Dupplin, near Perth, Dec. 25, 1674, died in St. Andrew's, Sept. 28, 1712. He was licensed to preach in 1699, and in the following year was settled as minister in Ceres parish, where he remained till called to the professorship of divinity in the college of St. Leonard at St. Andrew's in 1710. Entering on the duties of this latter office, he was seized in 1711 with a violent illness, from which he never entirely recovered. He was an accomplished scholar, and an able theological writer. His great work on "Natural Religion Insufficient, and Revealed Necessary" (4to., Edinburgh, 1714), has been often republished, and is still a standard work on that subject. His "Great

Concern of Salvation" (8vo., 1722), and his "Nature of Faith," are also able treatises. All these, together with his miscellaneous writings, and an interesting autobiographical memoir, have been published in repeated editions.

HALYS, the modern KIZIL IRMAK (red river), the largest river of Asia Minor, rises in the mountains which form the boundary between Armenia Minor and Pontus; flows with a W. or S. W. course, receiving many tributaries on its way, as far as Cæsarea Mazaca; then turns to the N. W., and gradually to the N. E., and discharges itself by several mouths into the Euxine between Sinope and Amisus. It has a circuit of about 600 miles. Its ancient importance appears from the fact that Asia was often divided into *Asia cis Halyn* and *Asia trans Halyn*. It was an early boundary between the Indo-European races in the western portion of Asia Minor, and the Semitic races which prevailed generally in south-western Asia. It separated the great Lydian empire from the Medo-Persian, and near its banks was fought the first battle between Croesus and Cyrus.

HAM, a small French town in the department of Somme, about 60 m. from Paris; pop. 2,375. It possesses a famous old castle, which was newly fortified toward the end of the 15th century and strengthened by modern works, so as to be now a fortress of some importance. Among the numerous eminent persons imprisoned in the castle of Ham were Joan of Arc, who spent there a few days before being surrendered to the English; Mirabeau; the ministers of Charles X.; Louis Napoleon, from Oct. 7, 1840, to his flight, May 25, 1846; the generals Cavaignac, Lamoricière, Ohangarnier, and Bedeau, Col. Charraa and others, who were for some time detained there after the *coup d'état* of Dec. 2, 1851.

HAM, one of the sons of Noah, supposed to have been the youngest. The name signifies in Hebrew "hot" or "burnt," and is regarded as indicative of the regions allotted to his descendants by his 4 sons, who, according to Gen. x., occupied the southern parts of the ancient world. The foundation of the empires of Assyria and Egypt is attributed to them, as well as that of Sidon and other Phœnician republics. Egypt, in particular, is designated in poetical passages of the Scriptures as the "land of Ham," which answers to the Coptic name of that country, *Kemî* or *Kamî*, the *Χημία* of Plutarch, and the *Chmê* of the Rosetta inscription, according to Champollion. The Canaanites formed a branch of the biblical Hamitic race.

HAMADAN, a town of Persia, in the province of Irak Ajemi, situated at the foot of Mt. Elwend, on the site, it is generally supposed, of the ancient Ecbatana, or, according to Col. Rawlinson, of one of the two Median cities of that name; pop. about 40,000. It occupies a large surface on a sloping ground, and has numerous gardens, bazaars, baths, caravansaries, and mosques. Near one of the latter is an edifice containing the tomb of Avicenna, the celebrated

Arabian physician, who lived there in the first half of the 11th century; another is believed by the inhabitants to contain the tomb of Esther and Mordecai. There are also a synagogue and an Armenian church. The town is mostly decayed and unattractive; the tomb of Avicenna, however, attracts numerous pilgrims. It has also a hot mineral spring, some manufactures in silk fabrics and carpets, and a large trade with Bagdad and various cities of Persia. Hamadan was conquered by the Arabs shortly after the death of Mohammed, was afterward destroyed and rebuilt, and was taken by the Seljooks, and by the Mongols of Genghis Khan and Tamerlane. (See *EOBATANA*.)

**HAMADRYADS** (Gr. *ἄμα*, together, and *δρυς*, an oak), in Grecian mythology, deities who presided over woods, and lived and died with the trees which were under their protection. The poets frequently confound the hamadryads with the dryads, naiads, and other rural nymphs.

**HAMAH** (the *Hamath* of Scripture and *Ἐπιφάνια* of the Syrian Greeks), a city of Syria, on the Aasy or Orontes, about 110 m. N. E. of Damascus; pop. 45,000, mostly Arabs. It is pretty well built, has large bazaars, numerous baths, mosques, hydraulic works, manufactures of silk, cotton, and woollen fabrics, and an active trade in these articles, as well as in wax, safflower, and other goods, with Aleppo and other towns of Asia and Africa. The city is often mentioned in Scripture as situated on the northernmost boundary of Palestine in its widest limits; it was the seat of a Syrian king, and called the Great (*Hamath Rabbah*) in the time of the Jewish kings, was conquered by the Assyrians, was flourishing under the Seleucids, and the capital of a Syrian principality in the middle ages. One of its princes was the celebrated Arabian historian Abulfeda, who died in 1381.

**HAMAN**, a minister of the Persian king Ahasuerus, of the race of Agag, who, because Mordecai the Jew refused to pay him homage, resolved on the destruction of all the Jews in the Persian monarchy. By falsehood and intrigue he succeeded in obtaining a decree for this purpose; but Esther, the Jewish consort of Ahasuerus, interposed for their deliverance, and Haman was hanged on the very gibbet he had caused to be prepared for Mordecai. His history is contained in the book of Esther.

**HAMANN, JOHANN GEORG**, a German philosopher, who, as author, adopted the appellation "Magus of the North," born in Königsberg, Aug. 27, 1730, died in Münster, June 21, 1788. His father destined him for the pulpit, but an impediment in his speech, the weakness of his memory, and his philosophical views, inclined him to critical, poetical, and philological studies. In 1755 he was received into the house of a merchant of Riga, and devoted a great part of his time to the study of politics and commerce. In 1756 he made a journey for the firm to Berlin, Lübeck, Holland, and England. In London he remained over a year, and, discontented with the result of his mission, abandoned himself to dissipation,

from which he was rescued by the reading of the Bible. In 1759 he enjoyed again a short period of leisure in his father's house, and occupied himself with classical and oriental literature. In 1762 he became a copyist in the office of the city governor; in 1765 again a tutor; in 1767 secretary in the custom house, and in 1777 baggage master. An anonymous friend relieved him at length, in 1784, from pecuniary cares, and enabled him to resign his place in 1787, in order to recover his shattered health by travel. He then lived, partly at Düsseldorf, partly at Münster, on intimate terms with Jacobi and the princess Gallitzin, who, when he died in the following year, had him buried in her garden. Hamann composed only small treatises (*Fliegende Blätter*), in which he opposed the prevailing intellectualism of his times. His style was diffuse and obscure, but Lessing, Herder, Goethe, Jacobi, and Jean Paul recognized his talent. Herder especially adopted many of his views, and gave to them a wider publicity. Fragments of his works were published by Cramer under the title *Sibyllinische Blätter des Magus aus Norden* (Leipzig, 1819), and his *Sämmtliche Schriften* by F. Roth (7 vols., Berlin, 1821-'5; vol. viii. containing "Additions and Explanations," by G. A. Wiener, Berlin, 1848). The first good work on his life and writings was published by E. H. Childmeister (*Hamann's des Magus in Norden Leben und Schriften*, 3 vols., Gotha, 1857).

**HAMBACH**, a village of Rhenish Bavaria, near Neustadt, containing the remains of the mediæval castle Kastanienburg, which has become renowned from the great popular gathering of May 27, 1833, held there under the leadership of the political writers Siebenpfeiffer, Wirth, and others, for the purpose of agitating and preparing "the regeneration of Germany as a free country." This gathering, known under the name of *Hambacher Fest*, was composed of about 80,000 Germans, principally from the Rhenish provinces, and of numerous Polish and French liberals, and became a source of rigorous persecutions on the part of the German governments. The castle was presented in 1842 to the crown prince, the present king of Bavaria, and has since been restored and called after him Maxburg. It was greatly damaged during the revolution of 1849.

**HAMBURG**, an independent republic of Germany, and member of the Germanic confederation, composed of the city of Hamburg with a small adjoining district on the Elbe, between Hanover and Denmark, some detached localities enclosed by Holstein, and the district of Ritzebüttel (in which is the town of Ouxhaven) and the island of Neuwerk at the mouth of the Elbe; area, 150 sq. m.; pop. in 1857, about 230,000, most of whom were Lutherans. The state has one vote in the deliberations of the federal diet, but in the select council of that body the Hanse towns united have but one. Its contingent to the federal army is 1,298. For its own purposes of police and defence, Hamburg has a burgher

guard, well trained and equipped. A new and more liberal constitution was adopted in 1859. Accounts are kept in marks current, worth 29.6 cts. U. S. currency, and marks banco, which are worth about 23½ per cent. more than currency. The revenue in 1858 was as follows:

Receipts.	Marks current.
From state property.....	639,450
" direct taxes.....	1,086,000
" indirect ".....	4,370,000
" miscellaneous sources.....	973,650
" special sources.....	62,000
Total.....	6,980,100

The expenditures for the same year were estimated at 7,425,410 marks, 7,115,410 being for ordinary charges, and 810,000 for extraordinary. The public debt, Jan. 1, 1858, amounted to 62,935,465 marks banco.—HAMBURG, the capital of the above republic, is one of the 4 remaining Hanse towns, and the principal commercial city of Germany; lat. 53° 32' 51" N., long. 9° 58' 33" E.; pop. in 1857, 169,718. It is built on the N. bank of the Elbe, at the mouth of the river Alster, 75 m. from the German ocean, 60 m. N. E. of Bremen, and 86 m. S. W. of Lübeck. The Elbe here contains several islands which belong to the state. The channel, from 800 to 750 feet in width, between them and the city, serves for a harbor, there being no docks, and numerous canals fed by the river give access to the merchants' warehouses. The Alster forms two lakes, one on the N. of the city called the Outer Alster, and the other just within the walls, known as the Inner Alster. They communicate with the Elbe by sluices, and also with a ditch 120 feet wide which surrounds the city and marks the former line of fortifications. The ramparts are now converted into walks and gardens. The city proper, within the line of ramparts, consists of an old and new town (Altstadt and Neustadt). The Hamburger Berg, or suburb of St. Paul, extends N. from the river till it touches the Danish city of Altona, from which it is separated by a ditch 8 feet wide. The suburb of St. George lies on the N. E., and a new suburb called the Hammerbrook on the S. E., on a piece of swampy land rescued from the river. The surface of this tract, over a mile square, has been raised 4 feet by rubbish from the great fire, which in 1842 burned down 61 streets, with 1,747 houses. Few of the public buildings are remarkable for architectural effect. The most interesting are the exchange, the new government house, the *Schulgebäude* (including the Johanneum college), the churches of St. Nicholas and St. Peter, both modern Gothic edifices, that of St. Michael, with a steeple 456 feet high, one of the loftiest in Europe, the new synagogue for the orthodox Jews opened in 1859, and the buildings occupied by the custom house and bank, and by the various post offices, several foreign states maintaining here post offices of their own. Sixty bridges cross the rivers and canals. The charitable institutions number about 260, including the Jewish hospital endowed by Solomon Heine in 1840, and which, according to the stipulations of the founder,

was thrown open to all Christian denominations after the emancipation of the Jews in 1849. The *Rauhes Haus* was founded in 1833 by the philanthropist Johann Heinrich Wichern at Horn, near Hamburg, for the benefit and training of depraved or abandoned children. It contains now several hundred, ¼ of whom are girls, who are employed in work for which they receive free board and education, but no pay. A seminary for the training of officers for this and kindred institutions was opened in 1845, and in 1851 one for the moral and scientific education of pupils of respectable families who pay for their tuition; also a school in which 12 of the staff of the *Rauhes Haus* are trained as teachers. The great hospital in the suburb of St. George accommodates from 4,000 to 5,000 persons. The orphan asylum educates and provides for 600 scholars. The principal educational institutions are the gymnasium and the Johanneum college, the latter containing the city library of 160,000 volumes and 5,000 MSS. Other libraries are the commercial, with 80,000 volumes, and the patriotic society's, with 40,000. There are museums of natural history, antiquities, and art, an academy of music, a botanical garden, and an observatory. The *Jung fernstieg*, or Maiden's Walk, is a fashionable promenade along the Inner Alster, whose waters on summer evenings are crowded with pleasure boats. The immediate environs of the city have many beautiful places of resort.—Hamburg has communication by railway with the principal cities of Germany, and by steamship with Helgoland, Hull, London, Newcastle, Liverpool, Leith, Amsterdam, Havre, Christiania, New York, &c. Beside this, 28 large packet ships sail regularly to Australia, Valparaiso, and San Francisco, 14 large vessels to New York, New Orleans, Galveston, and Indianola, 5 to New York direct, and others to various ports of North and South America. Vessels drawing 14 feet of water come up to the city at all times, but larger ships usually discharge cargo at Cuxhaven. A very large emigration takes place from Hamburg to the United States; in 1854 it amounted to 20,835, in 1855 to 8,590, and in 1856 to 16,766. The merchant marine of Hamburg, on Jan. 1, 1858, comprised 491 vessels, with a burden of 63,748 lasts—the last being equal to about 6,000 lbs. Of these, 20 were steamers, with an aggregate capacity of 5,337 lasts. The following table shows the movements of shipping at Hamburg in 1857:

Countries.	Entered.		Cleared.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
Great Britain and Ireland	2,247	647,208	2,836	676,189
Bremen and the Weser..	491	24,570	869	14,943
Holland.....	253	23,806	184	26,247
France.....	147	23,733	182	37,659
Brazil.....	108	25,938	119	26,048
Pacific coast of America.	75	29,686	46	16,500
United States.....	73	51,921	79	55,524
Lower Elbe.....	568	68,050	423	30,281
Upper ".....	4,998	515,875	4,680	571,406
Other countries.....	1,020	194,680	1,296	216,589
Total.....	10,060	1,682,492	9,663	1,671,265

In 1858 the entrances of sea-going vessels were 4,864, of which 486 were in ballast, and the clearances 4,377, of which 2,148 were in ballast. The commerce for the 6 years from 1852 to 1857 was as follows:

Years.	Imports.	Exports.
	Marks banco.	Marks banco.
1852.....	392,028,830	873,495,450
1853.....	448,879,580	431,678,490
1854.....	530,668,030	498,029,840
1855.....	528,556,190	507,231,600
1856.....	654,872,080	613,438,730
1857.....about	700,000,000	.....

The principal articles of import are cotton, wool, woollen and worsted stuffs, yarn, silk, hides, hardware, iron, coffee, sugar, wine, brandy, rum, tobacco, indigo, dye woods, tea, pepper, and coals. The exports consist of the same articles, except coal, Hamburg being mainly a centre of distribution. The manufacturing industry is important, and comprises ship building, sugar refining, distilling, calico printing, dyeing, the preserving of provisions, and the manufacture of sail cloth, ropes, leather, woollen goods, cigars, cutlery, musical instruments, carriages, furniture, hats, soap, glue, &c. Hamburg is the seat of many important banking and commercial houses, and no fewer than 1,000 brokers are engaged in mercantile agencies. It is renowned for its publishing houses, the principal of which is that of Hoffmann and Campe, the publishers of many of Borne's and Heine's works. Among the newspapers best known abroad are the *Börsenhalle*, *Hamburger Correspondent*, and *Hamburger Nachrichten*.—Hamburg is a very ancient city. Charlemagne built a castle here about the beginning of the 9th century. During its growth from a village into a town it was several times destroyed by Northman and Slavic neighbors. The emperor Otho IV. (1215) made it an imperial city, and in 1241 a commercial treaty into which it entered with Lübeck laid the foundation of the Hanseatic league. In 1536 it adopted the reformed religion. During the early part of the 16th century, although recognized as an estate of the empire, it was without a seat or vote in the diet, and was troubled by the kings of Denmark, who claimed its sovereignty as counts of Holstein. By convention with Denmark, in 1768, its rights were conceded, and in 1770 it was confirmed as a free city of the Germanic empire. The wars of the 18th century were rather favorable than otherwise to its prosperity, but in 1803 it fell under the power of the French, who after repeated exactions annexed it to the French empire as the capital of the department of Bouches d'Elbe. In 1813-'14 the French under Marshal Davoust sustained in it that terrible siege in which 40,000 citizens were driven out in mid-winter, and 1,100, whose monument is to be seen near Altona, perished of hunger. On June 8, 1815, it joined the Germanic confederation as a free Hanse town. On May 5, 1842, the conflagration above mentioned broke out, and burned for

4 days, destroying  $\frac{1}{4}$  of the city, since which time it has gained greatly in the beauty of many of its streets and public buildings. The town hall, which escaped from that casualty, was destroyed by fire in 1859.

HAMELIN, FERDINAND ALPHONSE, a French admiral, born at Pont-l'Évêque, Sept. 2, 1796. He served at an early age under the command of his uncle Jacques Félix Emmanuel Hamelin (1768-1839), who was a naval officer of great merit. In 1827 he took a successful part in the expeditions against the pirates in the Mediterranean, and in 1830 in those against Algiers. As naval commander in Oceania from 1844 to 1846, he displayed much diplomatic skill in the negotiation with the British on the subject of the Marquesas islands. In 1848 he was promoted to the rank of vice-admiral, became a member of the board of admiralty in 1849, and soon afterward maritime prefect of Toulouse. In July, 1853, he was nominated commander-in-chief of the French fleet in the Mediterranean, passed the Dardanelles, Oct. 17, entered the Bosphorus Nov. 17, and joined the English fleet. The united fleets bombarded Odessa, May 12, 1854, and Hamelin evinced great ability on this occasion, as well as afterward in superintending the embarkation and landing of the French troops in the Crimea, and during the attacks on the fortifications of Sebastopol. The emperor conferred on him the rank of admiral, Dec. 2, 1854, which entitles him to a seat in the senate. After the death of M. Ducos he was appointed (April 19, 1855) minister of marine, an office which he continues to hold (Oct. 1859).

HAMILCAR BARCA, or BAROAS, a Carthaginian general, and leader of the popular party, born shortly before the beginning of the 1st Punic war, fell in a battle against the Vettones in Spain, 229 B. C. The name Barca, which he had in common with many distinguished Carthaginians, is supposed to signify lightning, like that of the Hebrew commander Barak. Little is known about his early life, and he appears in history as commander of a Carthaginian army in the 18th year of the first Punic war, 247 B. C. The balance of this protracted struggle was then decidedly in favor of the Romans. The island of Sicily, its chief scene, was in their hands, excepting only Drepanum and Lilybæum on the W. coast, which they were blockading from the land side. Hamilcar boldly seized upon a commanding position, the summit of Ercte or Hercte, now called Monte Pellegrino, near Panormus (Palermo), where he encamped his troops, while the bay below, defended by the mountains, most favorably sheltered the Carthaginian vessels. From this double stronghold he made successful incursions into the interior of the island as far as the E. coast, and upon the S. coast of Italy, vanquished several Roman detachments, and took Eryx near the N. W. angle of Sicily (244). Holding this still more favorable position, he continued his incursions over the island and the peninsula. It was only the great defeat of the

Carthaginian fleet under Hanno by the newly formed Roman squadron under Lutatius Catulus, near the Ægates isles (241), which compelled him to give up the struggle. He was then commissioned by his countrymen to conclude a peace with the victorious enemy. His dauntless and patriotic spirit could not prevent the treaty from being humiliating to his country. He was allowed to embark with his army at Lilybæum, and to return to Carthage. Eager to vindicate the honor of his nation on a new scene of battle, he was delayed in his designs upon Spain by a mutiny of some mercenary troops, arising from the exhausted condition of the finances, which soon became a rebellion, threatening the very existence of the state. After the defeat of Hanno by the mercenaries, Hamilcar took the field against them, and finally succeeded in crushing the rebellion, which had raged for more than 3 years. He now entered upon his Spanish campaign, taking with him his young son Hannibal, whom before starting (235) he made to swear eternal enmity to Rome. The details of this new campaign are little known, but it is certain that he had conquered a part of Spain when he was overtaken by death. His conquests were continued by his son-in-law Hasdrubal, and afterward by Hannibal. He left two other sons, Hasdrubal and Mago, who both partook in the wars of their brother.

**HAMILTON**, the name of 6 counties in the United States. I. A. N. E. co. of N. Y., drained by the head waters of Black, Hudson, Racket, and Sacandaga rivers; area 1,711 sq. m.; pop. in 1855, 2,648. The surface is high, hilly, and diversified with lakes; the soil is poor, and a large portion of the county, traversed by the Adirondac mountains is still a wilderness. Timber and iron ore are abundant. The productions in 1855 were 251 bushels of wheat, 7,151 of Indian corn, 16,701 of oats, 25,257 of potatoes, 4,274 tons of hay, and 88,282 lbs. of butter. There were 23 saw mills, 1 grist mill, 3 tanneries, 5 churches, 28 school houses, and 1 newspaper office. A railroad from Saratoga to Sackett's Harbor has been proposed, which will pass through this county. Organized in 1838, and named after Alexander Hamilton. Capital, Lake Pleasant. II. A. N. co. of Florida, bordering on Georgia, bounded E. and S. by the Little Suwanee, and W. by the Withlacoochee river; area, 708 sq. m.; pop. in 1850, 2,511, of whom 685 were slaves. The surface is even, and the soil fertile. The productions in 1850 were 56,705 bushels of Indian corn, 22,073 of sweet potatoes, 560 bales of cotton, and 14,455 lbs. of rice. There were 12 churches. Capital, Jasper. III. A. S. E. co. of Tenn., bordering on Georgia, intersected by the Tennessee river, which is here navigable by steamboats; area, 380 sq. m.; pop. in 1850, 10,075, of whom 672 were slaves. It abounds in coal and iron. The surface is broken by high ridges connected with the Cumberland mountains, and the soil is fertile. The productions in 1850 were 520,542 bushels of Indian corn, 69,451 of oats, 37,531 of sweet potatoes,

64,650 lbs. of butter, and 10,251 of wool. There were 6 churches, 2 newspaper offices, and 1,835 pupils attending public schools. The Nashville and Chattanooga railroad passes through this county, and connects near its S. W. border with the Western and Atlantic railroad of Georgia. Capital, Harrison. IV. A. S. W. co. of Ohio, bordering on Indiana, separated from Kentucky by the Ohio river, and drained by Great and Little Miami and Whitewater rivers; area, 390 sq. m.; pop. in 1850, 156,848. It has an undulating surface and a rich soil. The grape is extensively cultivated near the Ohio river. The productions in 1850 were 1,593,618 bushels of Indian corn, 112,632 of wheat, 242,558 of oats, 405,988 of potatoes, 19,992 tons of hay, 18,619 lbs. of wool, and 742,834 of butter. There were 29 grist mills, 26 saw mills, 18 iron foundries, 5 woollen and 8 cotton factories, 27 tanneries, 56 newspaper offices, 156 churches, and 15,949 pupils attending public schools. The county is crossed by the Miami canal and by several railroads centering in Cincinnati, the capital. V. A central co. of Ind., drained by White river and several smaller streams; area, 400 sq. m.; pop. in 1850, 12,684. The surface is slightly diversified, and the soil is uniformly rich. The productions in 1850 were 663,903 bushels of Indian corn, 54,872 of wheat, 59,209 of oats, and 5,181 tons of hay. There were 22 grist mills, 6 saw mills, 3 tanneries, 1 newspaper office, 4 churches, and 456 pupils attending public schools. The county is traversed by the Peru and Indianapolis railroad. Organized in 1823. Capital, Noblesville. VI. A. S. co. of Ill., drained by branches of Little Wabash river and Saline creek; area, 395 sq. m.; pop. in 1855, 7,212. It has a well wooded surface, diversified with prairies of moderate fertility, and a great deal of swamp land in the N. part. The productions in 1850 were 242,955 bushels of Indian corn, 28,764 of oats, 8,295 lbs. of wool, and 48,055 of butter. There were 28 grist mills, 4 saw mills, 13 churches, and 1,468 pupils attending public schools. Capital, McLeansborough.

**HAMILTON**. I. A post township of Madison co., N. Y., with a village of the same name, on the Chenango river, 28 m. S. W. from Utica; pop. in 1855, 8,787. It contained in 1855 an academy, 10 churches (2 Baptist, 2 Congregational, 1 Episcopal, 4 Methodist, and 1 Universalist), 3 weekly newspaper offices, 3 tanneries, 1 grist mill, 1 furnace, 8 manufactories of coaches and wagons, 1 of tin and sheet iron, and 1 of chairs. It is the seat of Madison (Baptist) university, founded in 1820 and chartered in 1846, and having in 1858 9 professors, 891 alumni, 145 students, and a library of 7,457 volumes. Connected with it are a theological seminary, which has 4 professors and 36 students, and a grammar school with about the same number of pupils. II. A city, and the capital of Butler co., Ohio, on both sides of the Miami river, on the Miami canal, and on the Cincinnati, Hamilton, and Dayton, and the Cincinnati, Eaton, and Richmond railroads, 25 m.



by rail N. from Cincinnati, and 90 m. W. S. W. from Columbus; pop. in 1855, about 8,000. It is a prosperous manufacturing town, and is abundantly supplied with water power by a hydraulic canal, which gives a fall of 28 feet. In 1858 there were on the E. side of the river alone 4 grist mills, 2 cotton factories, 2 woollen factories, 2 paper mills, a planing mill, 2 iron foundries, several machine shops and saw mills, 8 or 10 churches, and 2 newspaper offices. The quarter on the W. bank, formerly the village of Rossville, was incorporated with Hamilton when the municipal charter was granted in 1858.

HAMILTON, a city and port of entry of Canada West, and capital of the co. of Wentworth, situated at the S. W. extremity of Burlington bay, at the W. end of Lake Ontario, and on the Great Western, the Hamilton and Toronto, and the Hamilton and Port Dover railways, 45 m. W. from Niagara Falls, and 88 m. by rail S. S. W. from Toronto; pop. in 1856, 22,240. The city is built on sloping ground, extending from the foot of a hill about  $1\frac{1}{2}$  m. to the shore of the bay, and is laid out with considerable regularity. The principal thoroughfare, King street, runs E. and W. through the city; the other most important business streets are James, John, McNab, and York. The commercial quarter is about a mile back from the bay. There are several public squares, on which the government buildings generally front, Court House square and Market square being among the finest. The city is lighted with gas, intersected by a system of sewers, and supplied with water from Lake Ontario (9 m. distant) by means of a magnificent system of works, which will cost when completed about \$800,000. The plan includes the construction of a basin on Burlington beach, and a distributing reservoir at the E. end of the city, into which the water is to be pumped. The public and private buildings of Hamilton, especially those erected within a few years, are mostly either of brick or of freestone or limestone, brought from quarries in the neighborhood which are supposed to be inexhaustible. The most elevated sites are occupied by residences and gardens. The banks, public offices, churches, and some of the stores, are good specimens of architecture, and the two principal hotels rank with the largest as well as the best conducted in the province. In 1857 the city had 24 churches (3 Baptist, 6 Church of England, 1 Church of Scotland, 1 Congregational, 4 Methodist Episcopal, 8 Presbyterian, 1 Roman Catholic, and 5 Wesleyan), a hospital, an orphan asylum, a free school with 6 primary schools, a mechanics' institute and reading room, a mercantile library and reading room with 2,000 volumes, a Bible society, several charitable associations, 2 monthly periodicals, 1 weekly, 2 semi-weekly, and 2 daily newspapers, a bank for savings, branches of the bank of British North America, commercial bank of Canada, bank of Montreal, and bank of Upper Canada.

It is the head quarters of the Gore bank, with a capital of \$800,000. The manufactures are extensive and important, embracing locomotives, cars, machinery, iron work, scales, &c. Large numbers of corn brooms are made for exportation, the material being obtained chiefly from Ohio. The commercial advantages of Hamilton, situated at the head of navigation on the lake, and surrounded by a rich and populous country, are of the first order. The Desjardins canal, 4 m. in length, connects it with Dundas; and the Burlington bay canal, which cuts through the beach dividing the bay from the lake, shortens its communication with Lake Ontario, while it has easy railway intercourse with nearly all parts of the United States and Canada. The value of its imports in 1855 was \$4,956,028, and that of its exports \$1,818,346; in 1858 the imports amounted to \$2,100,810, and the exports to \$962,576. About  $\frac{2}{3}$  of the imports are from the United States. The city returns one member to the provincial parliament. It was laid out in 1813.

HAMILTON, a municipal and parliamentary borough of Lanarkshire, Scotland, near the junction of the Avon with the Clyde, about 10 m. S. E. from Glasgow; pop. in 1851, 9,630. Manufactories of lace and muslins give employment to nearly 5,000 hands.

HAMILTON, ALEXANDER, an American statesman and political writer, born in the island of Nevis, West Indies, Jan. 11, 1757, died in New York, July 12, 1804. His father had emigrated from Scotland and established himself in mercantile business in St. Christopher's. His mother was of French Huguenot descent, the daughter of a physician named Fancette, settled in the island of Nevis. She had first been married to a Dane named Levine, a rich man whom she did not love, and from whom she obtained a divorce. Hamilton's father speedily failed in business, and passed the remainder of his life in poverty and dependence. His mother died in his childhood, but relatives of hers who resided at Santa Cruz took charge of the orphan, her only surviving child. There were no great advantages of education at Santa Cruz; but, possessing the French as well as the English tongue, young Hamilton eagerly read such books in both languages as fell in his way. He enjoyed also the advice and good will of Dr. Knox, a Presbyterian clergyman of the island, who had been struck with his abilities, and who gave him some assistance in his studies. At 12 years of age he was placed in the counting house of Mr. Nicholas Cruger, a merchant of Santa Cruz; but this occupation was not much to his taste, and in his earliest extant letter, written to a schoolfellow, he speaks with disgust of the "grovelling condition of a clerk," and wishes for a war. But though he did not like his mercantile employment, he applied himself to it with characteristic assiduity; and the practical knowledge acquired by the "grovelling clerk" was doubtless a stepping stone to his subsequent reputation as a financier.

he began to use his pen early, like most persons who have a capacity in that direction. Among her things, he wrote a description of a hurricane which St. Christopher's was visited in Aug. 172. This description, published in a newspaper of that island, attracted so much attention as to induce his friends to comply with his wish for a better education than could be had at home, and to send him to New York for that purpose. He was first placed in a grammar school at Elizabethtown, N. J., where he enjoyed the acquaintance of the families of William Livingston and Elias Boudinot, both afterward distinguished in the revolutionary struggle. His teacher was Thomas Barber, a man likely enough to inflame the military ardor of his pupil, since he himself when the revolutionary war began joined the army, served with credit, and rose to the rank of colonel. After a few months spent at Elizabethtown, young Hamilton entered King's (now Columbia) college. Beside the regular studies of an undergraduate, he also attended lectures on anatomy with the idea of becoming a physician. While he was thus engaged the quarrel with the mother country about the tea tax came to a crisis. Some differences in the city of New York as to the selection of delegates to the proposed continental congress led to a public meeting, held on July 6, 1774. Hamilton attended this meeting, and according to some accounts delivered a speech which first drew attention to him. Not long after he became a correspondent of "Holt's Journal," the organ of the New York patriots. A pamphlet having appeared attacking the proceedings of the continental congress, written by Seabury, afterward the first bishop of the American branch of the church of England, Hamilton replied to it in another pamphlet written with so much ability that it was ascribed to Jay. This reply drew out an answer, to which Hamilton rejoined in a second pamphlet. These pamphlets, and another which he published in June, 1775, on the "Quebec Bill," evincing a maturity of intellect very unusual in one so young, gave him standing and consideration among the popular leaders. Meanwhile he had joined a volunteer corps which met every morning for exercise; he also applied himself to obtain such information and instruction as he could as an artillerist. It was his fortune to be present at the first brush of arms that took place in New York, Aug. 22, 1775, the *Asia*, a British ship of war lying in the harbor, having fired upon a party employed in moving the cannon from the Battery. In March, 1776, though yet but 19 years of age, he obtained a commission as captain in an artillery company raised by the state of New York on the recommendation of Gen. Schuyler, then in command of the northern department. The remnant of his last remittance from Santa Cruz was employed in equipping this company. The main body of the continental army, lately employed in the siege of Boston, had now arrived at New York, which it was expected would be

the next object of attack, and Hamilton's company was attached to Scott's brigade. The mind of the young artillery captain was not, however, wholly absorbed in military matters; in the pay book of his company, which still exists, are notes which show that he was revolving in his thoughts the subjects of currency, commerce, the collection of taxes, and other questions of political economy. In the campaign which speedily followed Hamilton bore an active part. In covering the retreat from Long island he lost his baggage and one of his guns. It soon became necessary to abandon New York, and Washington retired to the upper part of the island on which that city stands. It was here that Hamilton, while employed in the construction of an earthwork, first attracted the attention of the commander-in-chief, who entered into conversation with him and invited him to his quarters. Hamilton's artillery formed a part of the detachment of 1,600 men posted at Chatterton's hill, the attack upon which by the British is commonly known as the battle of White Plains. He shared in the dispiriting retreat through the Jerseys, and his guns helped to check the advance of Cornwallis, who with greatly superior force came upon the retreating troops as they were crossing the Raritan. He also took part in the battles of Trenton and Princeton, by all which hard service his company was reduced to 25 men. The spirit and ability of the young captain of artillery had not escaped notice. He had received invitations from two major-generals to take a place in their staff. These he declined; but he accepted a similar offer from Washington, and on March 1, 1777, was announced in orders as aide-de-camp to the commander-in-chief with the rank of lieutenant-colonel. What Washington most wanted in his aides-de-camp, and what he found it very difficult to get, was competent assistance in the multifarious correspondence which he was obliged to carry on with congress, the governors of the states, the officers on detached service, and in regard to the exchange of prisoners and other subjects with the British commander-in-chief. He required somebody able to think for him, as well as to transcribe and to execute orders; and so much did he rely on Hamilton's judgment as to employ him, young as he was, in the most delicate and confidential duties. He was thus placed in a position which not only gave him an extensive view of the whole revolutionary scene, but enabled him, through the respect which Washington felt for his opinions, to exercise a certain influence over the course of events. After the battles of Brandywine and Germantown, in which Hamilton in his character as aide-de-camp to the commander-in-chief took an active part, he was despatched on a confidential mission to Putnam and Gates, to hasten forward the reinforcements which those officers after the surrender of Burgoyne's army had been directed to send to Washington. These orders, under a certain discretion allowed them, they had

been in no hurry to execute, and it required a good deal of firmness on Hamilton's part to accomplish the object of his mission. He spent the following winter in the camp at Valley Forge. When the enemy the next summer abandoned Philadelphia, he bore a very active share in the battle of Monmouth, an attack which, in common with Greene, Wayne, and Lafayette, he had strongly favored, notwithstanding the opinion of Lee to the contrary. Of the challenge which his fellow aide-de-camp Laurens sent to Lee, growing out of the incidents of that day, Hamilton was the bearer, and he acted as second to Laurens in the duel which followed. When Admiral D'Estaing arrived at Sandy Hook, Hamilton was sent by Washington to confer with him, and to make the arrangement which resulted in the attack on Rhode Island. His courtesy and tact made a very favorable impression on the French admiral, and he greatly assisted Washington in soothing D'Estaing, who was much disturbed by the ill feeling and complaints occasioned by his failure to support the land operations, as had been arranged. When in the autumn of the next year D'Estaing reappeared on the southern coast, Hamilton was again sent to express to him the views and wishes of Washington. He was at West Point at the time of the discovery of Arnold's treason, and strongly urged a compliance with André's last request to be shot. At the close of the year 1780 he married the second daughter of Gen. Schuyler, and by this alliance with a wealthy and influential family established for himself a permanent hold upon the state of New York. Shortly after his marriage he resigned his position as a member of Washington's staff. His high spirit and his self-esteem did not easily submit to the personal dependence which such a position implied. A rebuke from Washington which he thought unmerited was answered on the spot by a resignation, which he declined to withdraw, though Washington sent him an apology. But this separation did not interrupt their mutual confidence and esteem. He subsequently obtained a position in the line of the army as commander of a New York battalion, and in that capacity was present at the siege of Yorktown, where he led in the attack and capture of one of the British outworks. The ensuing autumn and winter he spent with his father-in-law at Albany; and, the war being now substantially over, he turned his attention to the study of the law. After a few months' study, chiefly of the forms of procedure, he obtained at the July term of the supreme court, 1782, a license to practise. A few days later he was elected by the legislature of New York a delegate to the continental congress, and took his seat in November following. During the year that he sat in this body Hamilton bore an active part in the proceedings relating to the settlement with the officers of the army as to their half pay, the treaty of peace, and attempts to provide means of meeting the public debt. He

had become fully satisfied of the necessity of giving increased authority to congress, and before his election had drafted a resolution which the New York legislature adopted, urging an amendment of the articles of confederation having that end in view. The city of New York having been evacuated by the British army, he resigned his seat in congress, and removed thither, and commenced the practice of the law. An act had been passed by the New York legislature just before, disqualifying from practical attorneys and counsellors who could not produce satisfactory certificates of attachment to whig principles; most or all the old city lawyers fell within this prohibition, which remained in force for 8 or 4 years, and enabled Hamilton and other young advocates to enter immediately on a run of practice which otherwise they might not have so speedily obtained. There existed indeed in the New York legislature a very bitter feeling against the Tories. Another act levelled against them, known as the "Treason Act," gave occasion to a suit in which Hamilton early distinguished himself. This act authorized the owners of buildings in the city of New York, who had abandoned them in consequence of the British possession of the city, to maintain suits for rent against the occupants, notwithstanding the plea on their part that the buildings had been held under authority from the British commander. Being retained by the defendant in one of these suits, Hamilton made a very elaborate plea, in which he maintained that whatever right might be given by the statute, the treaty of peace and the law of nations extinguished it. Though the popular sentiment was strongly against him, he prevailed with the court, whose decision was of the more consequence as there were many other cases depending on the same principle. The decision was denounced by a public meeting in the city called for that purpose; and the legislature, without waiting the result of an appeal, passed resolutions censuring the court. Hamilton defended his views in two pamphlets, and the spirit as an advocate and ability as a lawyer which he displayed in this case secured him at once a multitude of clients. He took an active part in establishing the bank of New York, the first institution of the kind in the state and the second in the Union, and was appointed one of its directors. He was one of the founders of the manumission society, of which the object was the abolition of slavery, then existing in the state of New York. By appointment of the state legislature he attended in 1786 the convention at Annapolis, and as a member of it drafted the address to the states which led to the convention the next year by which the federal constitution was framed. Having been chosen a member of the legislature of New York, he vainly urged the concession to congress of power to collect a 5 per cent. import duty, and the repeal of all state laws inconsistent with the treaty of peace. In another important matter, the settlement of the long pending controversy

between New York and Vermont, and the acknowledgment of the independence of Vermont by New York, he was more successful. Though the prevailing party in the New York legislature was little inclined to any material increase of the authority of the federal government, Hamilton was appointed one of the delegates to the convention to revise the articles of confederation, which met at Philadelphia in May, 1787. He had, however, two colleagues, who together controlled the vote of the state, of decidedly opposite opinions. Two projects were brought forward in that body, one known as the Virginia plan, which contemplated the formation of a national government with an executive, legislature, and judiciary of its own—the basis of the constitution actually adopted; the other known as the New Jersey plan, which was little more than an amendment in a few particulars of the existing confederation. In the course of the debate on these two plans, Hamilton delivered a very elaborate speech. As between the two plans, he preferred that which went furthest, though he doubted if even that was stringent enough to secure the object in view. He offered a written sketch of such a frame of government as he would prefer, not for discussion, or with the idea that in the existing state of public sentiment it could be adopted, but as indicating the mark to which he would desire to approach as near as possible. This scheme included an assembly to be elected by the people for 3 years; a senate to be chosen by electors chosen by the people, to hold office during good behavior; and a governor chosen also for good behavior by a similar but most complicated process. The governor was to have an absolute negative on all laws, and the appointment of all officers, subject to the approval of the senate. The governors of the states were to be appointed by the general government, and were to have a negative on all state laws. The power of declaring war and of ratifying treaties was to be vested in the senate. He insisted on the necessity of establishing a national government so powerful and influential as to create an interest in its support extensive and strong enough to counterbalance the state governments, and to reduce them to subordinate importance. Upon the adoption of the Virginia scheme his New York colleagues abandoned the convention in disgust. He too was absent for some time on business at New York, but returned again to the convention, and, though the constitution as reported by the committee of detail failed to come up to his ideas of energy and efficiency, he exerted himself to perfect it. He was one of the committee for revising its style and arrangement, and warmly urged its signature by the delegates present as the best that could be had. There still remained the not less serious and doubtful task of procuring for the constitution the consent and ratification of the states. The convention adjourned Sept. 17. On Oct. 27 there appeared in a New York journal the first number of a series of papers entitled the "Federalist," in support of the constitution

against the various objections urged to it. These papers continued till the following June, reaching the number of 65, and were republished throughout the states, and made a strong impression in favor of the new scheme of government. Much the larger number were written by Hamilton, a few by Jay, and the remainder by Madison. They are still read and quoted as a standard commentary on the ends and aims of the federal constitution and its true interpretation. In the convention of New York, of which Hamilton was a member, he sustained the constitution with zeal and success. The government having been put into operation under it, and congress at its first session having passed acts reorganizing the executive departments, Washington selected Hamilton as secretary of the treasury. At the ensuing session Hamilton presented an elaborate report on the public debt, and the reestablishment of the public credit. That debt was of two descriptions, loans obtained abroad, and certificates issued for money lent, supplies furnished, and services rendered at home. As to the foreign debt, all agreed that it must be met in the precise terms of the contract. As to the domestic debt, the certificates of which had largely changed hands at a great depreciation, the idea had been suggested of paying them at the rates at which they had been purchased by the present holders. The report of the secretary took strong ground against this project. He considered it essential to the reestablishment of the public credit that the assignees of the certificates should be considered as standing precisely in the place of the original creditors; and the funding system which he proposed, and which was carried in the face of a violent opposition, was based on this idea. Another part of the system not less violently opposed was the assumption of the debts contracted by the states in the prosecution of the late war. At the next session he proposed two other measures, both of which encountered a not less violent resistance—an excise duty on domestic spirits, and a national bank with a capital of \$10,000,000, a scheme which Hamilton had revolved in his mind for 10 years preceding. At the first session of the second congress Hamilton presented an elaborate report on the policy of having regard in the imposition of duties on imports to the protection of domestic manufactures, with an answer to the objections made against it—a summary of the arguments on that side of the question to which subsequent discussion has added but little. The success of the funding system and the bank gave Hamilton a strong hold upon the moneyed and mercantile class, but they raised against him a very bitter opposition, which extended even to the cabinet, Mr. Jefferson, the secretary of state, strongly sympathizing with it. Both the funding system and the bank were denounced as instruments of corruption dangerous in the highest degree to the liberties of the people, and Hamilton as designing to introduce by their means aristoc-

racy and monarchy. Charges of this sort, constantly iterated in a newspaper edited by a clerk in the state department, drew out from Hamilton a newspaper article under the signature of "An American," in which he charged upon Jefferson the instigation of these attacks, and urged the inconsistency of holding a place in an administration the policy of which he assailed. At the next session of congress a violent attack was made by Giles of Virginia upon the management of the treasury department. He moved 9 resolutions of censure, but Hamilton sent in a triumphant reply, and the proceedings proved a total failure. The breaking out of the war between England and France, by raising new questions as to the policy to be pursued toward the belligerents, aggravated the differences between Hamilton and Jefferson. Hamilton favored the policy of a strict and exact neutrality, and the right of the president to assume that position; and he defended his views in print under the signature of "Pacificus." Jefferson, finding Hamilton's influence predominant in Washington's cabinet on this question as on others, finally retired from it. The opposition to the excise law having proceeded in western Pennsylvania to the extent of violent resistance, it became necessary to call out an armed force to repress it; this operation was successfully conducted under Hamilton's eye. Having procured the adoption by congress of a system for the gradual redemption of the public debt, and finding his salary insufficient for his support, early in 1795, after 6 years' service, Hamilton resigned his office, and resumed the practice of the law in New York. He still remained, however, a warm supporter of Washington's administration. On the question of the ratification of Jay's treaty, by which the country was soon after greatly shaken, he gave effectual aid to the president's policy of ratifying the treaty, in a series of essays signed "Camillus." In the preparation of Washington's "Farewell Address," Hamilton's assistance was asked and given, precisely to what extent has been and still is a matter of controversy. Though Hamilton himself might rather be considered the leader of the federal party, the position of John Adams, and especially his command of the New England vote, made him the prominent federal candidate for the succession. About the time of Adams's accession to the presidency, the charges against Hamilton of misbehavior as secretary of the treasury were renewed in a new and aggravated shape. While Giles was hunting up matter for his abortive resolutions already referred to, some opposition members of congress, of whom Monroe was one, had fallen in with two persons named Olingman and Reynolds, who intimated that they were in possession of secrets very damaging to Hamilton's character. By way of confirmation Reynolds exhibited some notes in Hamilton's handwriting as proving a confidential correspondence between them. Under the idea that they had discovered a connection between Reynolds and Hamilton

for speculation in public securities, in which while at the head of the treasury Hamilton could not legally engage, Monroe and his companions waited upon Hamilton to ask an explanation. He speedily convinced them, by the production of other letters, that the correspondence between himself and Reynolds had grown entirely out of an intrigue with Reynolds's wife into which he had been entrapped. Though Monroe and his associates admitted that their suspicions of official misconduct were wholly removed, Monroe preserved certain memoranda of their interviews with Reynolds, Olingman, and Hamilton; and these, having come by some unexplained means into the hands of Callender, a pamphleteer of the opposition, were published, with the intimation—based on an opinion expressed by Olingman, in a conversation with Monroe after the interview with Hamilton, and Monroe's memorandum of which was not communicated to him—that the alleged intrigue was a falsehood invented by Hamilton and sustained by forged letters and receipts to cover up his illegal stock speculations. After a sharp correspondence with Monroe, whose explanations as to his memorandum and the credit he attached to it were not satisfactory, Hamilton published a pamphlet containing not only the correspondence with Monroe, but that also which he had exhibited to Monroe and his associates—a step into which he considered himself forced by the position assumed by Monroe. The difficulties with France consequent upon the ratification of Jay's treaty soon reached a point little short of war. A French invasion was apprehended. In the summer of 1798 additions were made to the regular army, further additions were provisionally authorized, and Washington was appointed commander-in-chief with the title of lieutenant-general. He accepted with the understanding that he should not be called into active service except in the event of hostilities. He also made it a condition, with which Adams at last reluctantly complied, that Hamilton should be major-general, thus throwing upon him the details of the organization of the army. While thus engaged in the military service he did not neglect the use of his pen, but wrote in defence of the policy which had led to these military preparations. The appointment made by Adams, in Sept. 1799, of a new embassy to France contrary to the advice of his cabinet, was strongly disapproved by the more ardent federalists, and among others by Hamilton, who succeeded, on Washington's death shortly after, to the command in chief of the army. This step on Adams's part produced a breach in the federal party. Yet Hamilton and his friends, considering the strong hold that Adams still held on New England, could not venture openly to oppose his reelection as president. The most they could do was to endeavor by a secret understanding to secure a greater number of votes for the other candidate who might be placed on the federal ticket; candidates being voted for, as the constitution then

stood, without designating whether for president or vice-president, the first office falling to him who had the highest vote. Whether the federalists would be able to command a majority of the electoral votes seemed likely to depend on the political complexion of the legislature of New York, and that in its turn on the character of the delegation from the city of New York. To secure that delegation, Hamilton on the one side and Aaron Burr on the other made every possible exertion. Burr, who was a master of all the arts of political intrigue, succeeded in carrying the day. Shortly after this election the breach in the federal party became fully apparent. Adams dismissed the chief members of his cabinet, whom he accused of being under Hamilton's influence and belonging with him to a British faction. Hamilton in his turn printed a severe criticism on Adams's political character, intended for private circulation among the leading federalists, but of which the publication became necessary in consequence of extracts from it which found their way into some of the opposition newspapers. The presidential election went against the federalists, but the result showed an equal vote for Jefferson and Burr. The federalists in the house of representatives (to which body it fell to decide between them), being strong enough to control or neutralize the vote of half the states, favored the election of Burr; but Hamilton, who entertained a very unfavorable opinion of Burr, remonstrated strongly against this attempt to make him president. The arrangements with France had already led to the discontinuance of the military preparations against her, and Hamilton returned again to the practice of the law. In a political trial in 1804, which attracted great attention, he supported the doctrine that to publish the truth is no libel. The court charged against him, but the doctrine which he maintained was adopted by the legislature, and has since prevailed throughout the United States. Burr, having lost the confidence of his party, and being unable to obtain a renomination as vice-president, sought to be elected governor of New York. He hoped to receive the support of the federalists, then in a minority and unable to elect any candidate of their own. Hamilton's opinion of Burr had undergone no change, and at a federal caucus he warmly opposed the project of supporting him for governor. He took no active part in the election, but his opinions were freely quoted by those who did. Burr, disappointed in his election, as he believed, through Hamilton's instrumentality, became eager for vengeance. He called on Hamilton to disavow having used pending the election any expressions derogatory to his personal honor, and, in spite of Hamilton's attempts to prevent such a result, pushed the matter to the extremity of a challenge. This challenge was accepted by Hamilton, but not in the spirit of a professed duellist. The practice of duelling he utterly condemned; indeed, he had himself already been a victim to it in

the loss of his eldest son, a boy of 20, in a political duel some 2 years previously. This condemnation he recorded in a paper which under a premonition of his fate he left behind him. It was in his character of a public man that he accepted the challenge. "The ability to be in future useful," such was his own statement of his motives, "whether in resisting mischief or effecting good in those crises of our public affairs which seem likely to happen, would probably be inseparable from a conformity with prejudice in this particular." The meeting took place, July 11, 1804, at Weehawken on the Hudson opposite New York, and at the first fire Hamilton received a wound of which he died the next day. The object alike of bitter hatred and of the warmest admiration, Hamilton enjoyed among his contemporaries, both friends and foes, a reputation for first-rate ability, which he still retains. He was under the middle size, thin in person, and very erect, courtly, and dignified in his bearing. His figure, though slight, was well proportioned and graceful. His complexion was very delicate and fair, his cheeks rosy, and the whole expression pleasing and cheerful. His voice was musical, his manner frank and cordial. He excelled equally as a writer and a speaker. His widow survived him 50 years, having died in 1854 at the age of 97. Of the 7 children whom he left behind him, several still survive. His writings, exclusive of the "Federalist," have been published in 7 volumes, edited by his son John C. Hamilton, who has also compiled an elaborate work in several volumes under the title of "History of the Republic of the United States, as traced in the Writings of Alexander Hamilton and his Contemporaries."

HAMILTON, COUNT ANTHONY, a French writer, born in Ireland about 1646, died at St. Germain-en-Laye, near Paris, in 1720. He belonged to an illustrious Scotch family, and on the death of Charles I. was taken to France, where he received his education. On the restoration of Charles II. he returned to England, and was presented at court, but, being a Catholic, received no official appointment. James II. gave him an infantry regiment in Ireland and the government of the city of Limerick. In 1688 he accompanied the exiled king to France, and remained one of his faithful courtiers, while he lived on friendly terms with his natural son, the duke of Berwick. During this period he wrote his spirited works, which still hold a place in French literature. The best known, *Les mémoires du comte de Grammont*, is a narrative of the licentious life of his brother-in-law, and a faithful picture of the court of Charles II. of England. He left also several tales, written to burlesque the then recently published Arabian Nights—*Le béliar*, *Fleur d'épine*, *Les quatre Facardins*, and *Zénide*—as well as miscellaneous light poems. The *Mémoires* have been frequently translated in England, one of the best editions being that published in Bohn's series, with notes and illustrations by Sir Walter

Scott, the personal history of Charles, and the Boscobel tracts (small 8vo., London, 1858). Hamilton's tales, under the title of "Fairy Tales and Romances," have also been translated into English and published by Bohn (London, 1849). The best French edition of his complete works is by Renouard (8 vols. 8vo., Paris, 1812).

HAMILTON, ELIZABETH, an Irish authoress, born in Belfast in 1758, died in Harrowgate, England, July 25, 1816. She spent considerable time in Scotland, as governess in the family of a Scottish nobleman, and some of her most interesting works sprung from the friendships which she formed and the observations which she made in that country. Among these are her "Letters on the Formation of Religious and Moral Principle" (2 vols. 8vo., London, 1806), addressed to the eldest of her pupils, and her "Cottagers of Glenburnie," a tale illustrative of the indolence and slovenly habits of the Scottish peasantry of that day. The most important of her other works are: "Letters of a Hindoo Rajah, written previous to and during the period of his Residence in England" (2 vols. 8vo., 1796), a fictitious work describing English manners; "Memoirs of Modern Philosophers" (3 vols. 8vo., Bath, 1800); "Letters on the Elementary Principles of Education" (2 vols. 8vo., 1801); "Memoirs of the Life of Agrippina the Wife of Germanicus" (2 vols. 12mo., London, 1811); "Popular Essays on the Understanding, Imagination," &c. (2 vols. 8vo., 1815).

HAMILTON, GAVIN, a Scottish artist, born in Lanark in the first half of the 18th century, died in Rome in 1797. At an early age he went to Rome, where he studied painting. He spent the latter part of his life exploring the neighborhood of Rome for ancient monuments and statues, which he bought and sold, and of which he made a large and valuable collection.

HAMILTON, JAMES, an American statesman, born in Charleston, S. O., May 8, 1786, drowned at sea, Nov. 15, 1857. His father was a distinguished officer of the continental line of the revolution, and was one of the favorite aids of Washington. The son was educated for the bar, but entered the army and served with credit as a major in the Canadian campaign of 1812. At the end of the war he resumed the practice of the law in Charleston in connection with James L. Petigru. For several successive years Mr. Hamilton was chosen mayor, or, as it was then termed, intendant of Charleston, an office which he filled with eminent ability. To his vigilance and activity was chiefly due the detection of a formidable conspiracy in 1822 among the negro population, led by Denmark Vesey, a free mulatto from Hayti. In the same year Mr. Hamilton was elected to the state legislature, where he distinguished himself as a debater, and was also chosen a representative in congress, of which he soon became a prominent and popular member. With Calhoun, McDuffie, and Hayne, he became noted for intense and energetic opposition to the protective system. He was in favor of direct taxa-

tion, regarding all indirect processes for raising revenue as frauds upon the people, and as disparaging to the popular intellect as well as popular morals. While in congress Mr. Hamilton acted as second to John Randolph in his famous duel with Henry Clay, of which affair he wrote a very interesting account. He was also second to Gov. McDuffie in his duel with Col. Cummings of Georgia. He served in the same capacity on other occasions of this sort, though he always humanely sought to effect an honorable adjustment of the cause of quarrel. During the contest for the presidency between Gen. Jackson and John Quincy Adams he was an active partisan of the former. President Jackson in 1828 offered him the secretaryship of war, which he declined. He was then offered the post of minister to Mexico, with authority to negotiate the annexation of Texas. This also he declined. His refusal of these offices was the result of a previously formed resolution to devote himself exclusively to the service of his native state. He quitted congress to become the governor of South Carolina in 1830, at an interesting and trying period, when the state had resolved upon nullifying the tariff laws of the federal government. It was a crisis well calculated to test the ability, the courage, and the firmness of the leading nullifiers. They stood almost alone against the rest of the nation; for though in some of the neighboring states there was much sympathy for them and their doctrines, there was no disposition to take part with them in forcible resistance to the national authority. Their position was generally regarded as that of traitors who were meditating a dissolution of the Union. The majority of the nullifiers, however, strenuously denied that nullification necessarily involved disunion or secession. Mr. Hamilton said to Edward Livingston, on the publication of Jackson's proclamation against the nullifiers, that "South Carolina did not intend to leave the Union unless the federal executive should drive her out by the sword." The people of South Carolina, failing to convince congress of the unconstitutionality of a protective tariff, resolved to throw the state upon her reserved and sovereign rights, and to nullify laws which they deemed to be antagonistic to the primary law of the constitution, by interposing the state veto, and forbidding within the limits of South Carolina the execution of the acts of congress to which they objected. The veto of the state, they held, might arrest special legislation without subverting the government. They claimed that congress had no power for constructive legislation; that the states were sovereign with respect to all rights that had not been specially conceded to the federal government; and that there was no tribunal which could decide between them and the federal government in case of an alleged infraction of the constitution, of which they alone were judges. These questions were maintained by Mr. Hamilton with much zeal and force in a great variety of essays

and speeches. On the settlement of this question by Mr. Clay's compromise, Mr. Hamilton retired from public life, and devoted himself to the care of his plantation. In course of time, however, he became ardently interested in the cause of Texas, to which he devoted his personal services and a large portion of his private fortune. In 1841, while Texas was an independent republic, he was her minister to England and France, where he procured the recognition of her independence. On the death of Mr. Calhoun in 1852, he was appointed his successor in the U. S. senate, but for domestic reasons he declined the office. He had given himself so entirely to the service of Texas, that in his efforts in her behalf he had expended his fortune and literally ruined himself, becoming greatly involved in pecuniary difficulties, which harassed the latter years of his life. He was on his way to Texas to seek indemnification for his losses when he perished by a collision between the steamboats Galveston and Opelousas, in the latter of which he was a passenger. With his usual courtesy and generosity he yielded his own chance of safety to a lady among the passengers, to whom he was an entire stranger. Mr. Hamilton's labors for the public good were not confined to politics. He took an active part in railroad enterprises in the South, and in the extension and elevation of southern commerce. He was also one of the founders of the "Southern Review," to which he was a frequent and popular contributor. While intend-ant of Charleston he exerted himself to adorn the city, and was one of those to whom the place is indebted for its Prado or public walk. The last production of his pen was an address to the legislature of South Carolina, on the eve of his departure on his fatal voyage, in which he made a sad and eloquent review of his contemporaries of the day of nullification, Calhoun, Hayne, McDuffie, Turnbull, Harper, and Preston.

HAMILTON, ROBERT, a Scottish mathematician and political economist, born in Edinburgh in June, 1748, died in Aberdeen, July 14, 1829. In youth he showed a great predilection for literary pursuits, but was compelled by circumstances to spend some time in a banking establishment as a preparation for a mercantile career. This occupation turned his attention to the money system of the country and to the study of political economy. He attracted the notice of Lord Kames by a review of one of the latter's works, and in 1766 became so favorably known as a mathematician and economist, that, although but 28 years of age, he was induced to offer himself as a candidate for the mathematical professorship of Marischal college, Aberdeen. He was unsuccessful in this instance, but 3 years later was appointed rector of the academy at Perth. In 1779 the chair of natural philosophy in Marischal college was presented to him. After retaining this but one year, however, he exchanged it for the more congenial professorship of mathematics in the same college. His chief work, an "Inquiry

concerning the Rise and Progress, the Redemption and Present State, and the Management of the National Debt of Great Britain" (8vo., Edinburgh, 1818), was the first important attempt to overthrow the sinking fund system, which had for many years been considered an axiom in financial science. Hamilton's views were subsequently regarded with favor in other countries beside Great Britain, and adopted by Ricardo, Say, McCulloch, and all the eminent political economists of the day. His remaining works are: "Introduction to Merchandise" (2 vols. 8vo., Edinburgh, 1777-'9), recommended by McCulloch, and of which several editions have been published; "Arithmetic and Book-keeping" (12mo., London, 1788); "The Progress of Society," a posthumous work (8vo., 1880); essays on "Peace and War," "Rent," &c.

HAMILTON, WILLIAM, a Scottish poet, born in Bangour, Ayrshire, in 1704, died in Lyons, France, March 26, 1754. He was living a life of agreeable literary leisure when the young pretender raised the standard of revolt. An ardent Jacobite in politics, he at once joined the cause, and celebrated the victory of Preston Pans in his stirring ballad "Gladsmuir." After the battle of Culloden he fled to the highlands, and made his escape to France. His friends soon procured a royal pardon for him, and he returned to Scotland, whence however his health, shattered by the privations he had endured, compelled him soon after to depart for southern France, and for several years previous to his death he resided at Lyons. His ballad of "The Braes of Yarrow" is the best known of his effusions.

HAMILTON, SIR WILLIAM, a British diplomatist and antiquary, born in Scotland in 1780, died in London, April 6, 1808. He was of good family, and a foster brother of George III., but poor, beginning life, as he said, with £1,000. In 1755 he married a wealthy lady, distinguished for many personal attractions, and was enabled to pursue his favorite studies in art, natural philosophy, and literature. In 1764 he was appointed English ambassador to Naples, and from his arrival in that country studied earnestly not only its geological and volcanic phenomena, but applied himself with zeal to collecting and illustrating the art relics with which it abounds. He was among the first of those to whom the British public are indebted for a comprehensive knowledge of Greek, and especially Etruscan antiquities, having made a large collection which was purchased for the British museum. He lost his wife in 1782, and in 1784 made a voyage to England, to hinder his nephew from marrying the celebrated Emma Harte; whom, however, he himself took back to Italy and privately made his wife, but did not publicly present as such till 1791, in which year he was appointed privy councillor. In 1798 he effected a treaty of alliance between the courts of St. James and Naples, but much of the political management at the latter court in those eventful times is attributed to the influence



of his wife and Lord Nelson. He contributed largely toward aiding Father Piaggi in unrolling MSS. found in Herculaneum. He was recalled to England in 1800, at which time he lost by shipwreck a large collection of antiques. Drawings of these had been kept, and their publication was assigned to D'Hamarville, who gave Sir William no share of the profits. A claim of Sir William's on the British government for special services was disallowed, and he died in comparative poverty. His works are: *Antiquités Étrusques, Grecs et Romaines, tirées du cabinet de M. Hamilton* (4 vols. fol., Naples, 1766); "Observations on Mount Vesuvius, Mount Etna, &c." (London, 1772); *Campi Phlegrai* (2 vols. fol., Naples, 1776-'7, with sup. in 1779); and *Lettera sul Monte Voltura* (Naples, 1780). Ten of his papers upon various Italian subjects were published in the "Philosophical Transactions" (1787-'95). Many of the marbles of the Townley gallery in the British museum were collected by him.—EMMA LYON, alias HART, afterward LADY HAMILTON, wife of the preceding, born, according to some biographers, in Wales, according to others in the co. of Chester, about 1770, died near Calais in 1815. She was the illegitimate child of a poor servant girl, but, being naturally intelligent and devoted to reading, was at the age of 13 employed to take care of the children of a brother-in-law of the engraver Boydell. At 16 she was shop girl for a mercer in London, a situation in which her beauty and vivacity exposed her to much temptation, which was in no degree decreased by her becoming chambermaid to a lady of rank, and seeing more intimately that gay life of fashion toward which her ambition tended with unusual strength. Here she devoted herself to reading plays and novels with such eagerness as to be dismissed for neglect of her duties. She then became waitress in a tavern much frequented by literary men, painters, actors, and artists. While here, learning that a young sailor, her cousin, had been pressed into the navy, Emma went to his captain, John Willett, to beg for his release. The captain let the cousin go, but kept the girl as his mistress. This illicit union endured for several years, during which time Miss Lyon, being provided with teachers, acquired an excellent education. Capt. Willett, becoming eventually weary of the connection, gave her to a friend, who however quarrelled with her at the end of a month and left her in extreme poverty. A noted quack named Graham, celebrated for his *megalanthropogenesis*, or reviving cure, had contrived a bed of Apollo, or "celestial bed," on which, in a delicately colored light, an exquisitely beautiful woman, nearly naked, was gradually unveiled to soft music as Hygeia the goddess of health. Having seen Emma, Dr. Graham engaged her for the part of the goddess, in which she created a great sensation. Painters and sculptors eagerly studied the new divinity, or were fascinated by her; among the latter was the celebrated Romney. Among her many

conquests Emma soon made that of Charles Greville, of the ancient family of Warwick, a man celebrated for wit and genius. By him she had 8 children, and fascinated him to such a degree that he determined to marry her, and would have done so but for the opposition of his uncle, Sir William Hamilton. But so soon as the latter beheld her, he in turn was fascinated. A contract was now made between uncle and nephew by which it was agreed that Emma should be transferred to the former, and that he should pay the debts of his nephew. At first his mistress, she soon blinded her new lover so completely as to become his wife, and was presented as such by him to the queen of Naples in 1791, by whom she was most graciously received into intimacy and confidence. Her extraordinary talents for political as well as personal intrigue here found a wide field for action. She soon formed an illicit connection with Lord Nelson, which her husband for expediency's sake tacitly encouraged. At this time the kingdom of Naples was critically situated, a French invasion being dreaded, while on the other hand fears were entertained lest England should ruin its trade. Charles IV. of Spain having written to his brother, the king of Naples, a letter complaining of and violently accusing the English, this letter was shown by the queen to her friend Lady Hamilton, by whom it was sent to the British cabinet. The result was that England at once attacked the Spaniards, and a vast loss of lives and of treasure to the latter was caused by the violated confidence. In 1798 the arrival of the French in Naples suddenly interrupted the festivities being held in honor of Nelson's victory at Aboukir. A panic ensued, and the royal family took refuge, accompanied by Sir William and Lady Hamilton, in Nelson's ship, which took them to Palermo. When the latter returned to Naples, much political vengeance was unscrupulously consummated, and of this Lady Hamilton was said to have availed herself to punish personal enemies; Nelson's violent measures, contrary to the articles of capitulation, having been urged, it is alleged, by his mistress. The execution most distinctly charged to her on this occasion was that of the Neapolitan admiral, Prince Caraccioli, who was hanged at the yard arm. Having returned with her husband to England, Lady Hamilton found herself generally despised on account of her relation to Nelson, who had resigned his command to enjoy her society. In England she gave birth to a daughter, whom she named Horatia Nelson, and resided at a country seat which Nelson had given her. After the death of her husband, and especially after that of Nelson in 1805, she was left destitute by the conduct of the 2d Lord Nelson, and she left England for France, where she died in abject want and misery. The last wish of Nelson when dying was that his daughter Horatia might be cared for by his country—a request whose neglect has caused at different times much controversy in the press.

**HAMILTON, SIR WILLIAM**, a Scottish philosopher, born in Glasgow, March 8, 1788, died in Edinburgh, May 6, 1856. He was of aristocratic lineage, being the 24th male representative of the 2d son of Sir Gilbert, the founder of the noble house of Hamilton in Scotland. The ancestor from whom he inherited his baronetcy received his title in 1673, for the services of his father at the battles of Dunbar and Worcester. The baronetcy had lain dormant for some time when Sir William in 1816 formally established his right to the title. From his boyhood Hamilton manifested a great intellect, a fine sense of honor, and a frank and manly bearing. He entered the university of Glasgow, taking a high position in the classes, and carrying off the first prizes in philosophy. From Glasgow he proceeded, on the Snell foundation, to Balliol college, Oxford, in 1809, just after the introduction of a new system, by which a powerful stimulus had been given to the whole course of study, and great rivalry excited among the colleges; the degree examinations had, therefore, become more severe. The candidates for honors were required to profess a certain number of books in history, poetry, and science; but Sir William, in going up for his degree, not only took with him into the schools far more than the usual average of books in poetry and history—in fact, every classic author of mark, whether poet, orator, or historian—but in science he professed all the works extant in Greek and Roman philosophy, including not only the whole of Aristotle, but all the works of his earlier commentators; and not only all of Plato, but the Neo-Platonists, Proclus, and Plotinus, and the fragments of the earlier and later philosophical doctrines preserved by Lærtius, Stobæus, and the other collectors. His examination in philosophy occupied two days, running through 6 hours each day. "In 14 of his books on Greek philosophy," says an eye-witness, "he was not questioned, the greater part of these being declared by the masters to be too abstrusely metaphysical for examination." At this early age he had not only carefully studied the leading Greek commentators on Aristotle—Themistius, Alexander, Ammonius, Simplicius, and Philoponus—and the works of the Arabian expositors, Averroes and Avicenna, but also the more philosophical of the Latin fathers, especially St. Augustine, of whom he always retained a high admiration, and the chief of the schoolmen, St. Thomas and Scotus in particular. He had also at this time formed an acquaintance with the less known authors of the revival, Cardan, the elder Scaliger, Agricola, Valla, and Vives; and had studied diligently the earlier modern philosophers, Descartes and Leibnitz, both in their own writings and those of their followers; and was deeply interested in the new speculations on the continent of Europe, which had as yet not found their way into Britain. He had, in fact, before he left the university of Oxford, gone over those vast researches into philosophical opinions which he afterward made so complete. In 1812 he

left Oxford, and went to Edinburgh to pursue the profession of the law, and in the following year was admitted a member of the Scottish bar. He at once began practice as an advocate. But, beside that the business of a young lawyer is not generally very engrossing, and therefore he had leisure for his literary pursuits, Sir William, like Bacon, could not confine his great powers within the narrow limits of a profession, but explored the amplitudes of science, especially inquiring into the hidden mysteries of the intellectual world. So ardent a student was he, searching into libraries for forgotten learning, and often perplexing bibliographers and scholars by his inquiries about unobserved first editions of books, and his ready and extensive knowledge of rare manuscripts, that he was looked upon as a prodigy of erudition in the social circles of Edinburgh. In 1820 the chair of moral philosophy in the university of Edinburgh became vacant by the death of Dr. Brown, and Sir William became a candidate for the place. John Wilson, his friend and fellow advocate, was his competitor. Sir William's superior qualifications were urged in testimonials of the greatest weight; even Dugald Stewart wrote: "I look forward with peculiar satisfaction to my future connection with him, if, fortunately for the university, he should succeed in attaining the object of his present ambition." Politics ran high at this time, and therefore every one was counted a whig or tory, whether he meddled in politics or not. Wilson was a tory; and as a majority of the electors were tories, Wilson was, of course, elected to the vacant chair. He proved to be an able professor; but, with all his genius for letters, he was, as a philosopher, far in the distance behind his friend Hamilton. By appointment of the faculty of advocates, Sir William, in 1821, delivered from the chair of universal history in the university of Edinburgh a short course of lectures on the character and history of the classic nations of antiquity, with the influence of their literature, philosophy, and laws on modern civilization. The lectures were distinguished for sagacity, learning, eloquence, and philosophical spirit. At this time phrenology, by the endeavors of George Combe, was exciting especial interest in Edinburgh. For the purpose of testing, on its own ground of physiological facts, the pretensions of this new claimant in the field of science, Sir William went through a laborious course of comparative anatomy, dissecting with his own hands several hundred different brains. He sawed open a series of skulls of different nations, of both sexes and all ages, to ascertain the facts in regard to the frontal sinus on which the phrenologists had founded so much. He also instituted a series of most sagacious experiments for ascertaining the relative size and weight of brains. The results of these investigations were embodied by him in two papers, and read before the royal society of Edinburgh in 1826. They maintained that the assertions of fact by the phrenologists were utterly false in every

fundamental particular; and some traditional errors in physiology, which the medical profession itself had credited and taught in their writings, were rectified by some of Sir William's experiments. The points in which he had charged the phrenologists with fatal errors were reproduced by others on the continent of Europe as well as in Britain, and contributed to arrest the progress of the system. But there were errors of a more intellectual cast to engage his attention. Schelling and Hegel had propounded in Germany, each differing a little from the other, a scheme of human omniscience as a system of philosophy. A doctrine so extraordinary and of such high pretensions, upheld as it was by powerful talents, could not but arrest the attention of speculative minds. Victor Cousin, disciplined in the school of Descartes, where the supremacy of consciousness is the fundamental tenet, could only admit the omniscient doctrine of the German philosophers as modified by the fundamental dogma of his own school; and this he did, and proclaimed it to the world in a course of lectures distinguished for rare eloquence and great speculative genius well nurtured in the literature of philosophy. But a doctrine of human omniscience, however modified, can never escape being challenged by the common sense of man; and of all countries in Europe, Britain is the one least likely, from the course of its speculation for centuries, to let such a scheme of thought elude its criticism. Accordingly, in 1829, on the retirement of Lord Jeffrey from the editorship of the "Edinburgh Review," his successor, Professor Napier, a personal friend of Sir William Hamilton, being desirous of signalizing his first number, induced the latter to give him a philosophical article. Even while at Oxford, Sir William had scrutinized this portentous continental doctrine with profound interest, and now determined to weigh it in the scales of criticism, and show to the world its real worth both in its French modification and its native German originality. Adopting, therefore, the lectures of Cousin, then lately published, as the basis of his criticism, he put forth in the "Edinburgh Review" the most powerful, subtle, and effective polemic ever urged against a doctrine since man began to speculate. The exhaustive statement of the necessary conditions of the problem supposed to have been solved, and of all the possible forms of its solution, enabled him, by the use of the dilemma of which he was such a master, to expose the utter baselessness of a doctrine of human omniscience. His analysis of the notions of the absolute, the infinite, and the unconditioned, opened up a new vista in the province of speculation, and led to a more comprehensive and at the same time more accurate apprehension of the limits of the knowable, marking one of the most memorable epochs, and determining Sir William's historical position, in the progress of philosophy. When Cousin read this masterly disquisition, in which his doctrine was dissected and exposed

by a relentless dialectic, he pronounced it a masterpiece, and could not rest until he ascertained who the author was, and even had the chivalry to have it translated into French. In 1836 Dr. Ritchie, the professor of logic and metaphysics in the university of Edinburgh, resigned his chair, and Sir William declared himself a candidate for the post. Prior to this he had contributed to the "Edinburgh Review" other articles, in which he examined all the central problems in metaphysics, psychology, and logic, showing that he was master of all the literature of philosophy, as well as possessed of a powerful genius for original speculation, which had attracted so much attention as to be, in conjunction with the first article, translated into most of the languages of Europe. He had made it manifest, that after examining the doctrines of his predecessors, he had laid speculative science on broader and surer foundations. But notwithstanding his preëminent qualifications, his pretensions were so far challenged, that it became doubtful whether he could be elected to the chair. Mr. Cousin, on hearing that there was a difficulty about Sir William's election, wrote a letter of mingled surprise and urgency in his behalf; and so did Professor Brandis of Bonn. He was elected, and his country was saved from the disgrace of rejecting the best qualified man in the whole world for the vacant chair in her leading university.—Now begins a new era in Sir William's life, and in the academical life of Scotland. The great champion of Scottish philosophy, who had dealt destruction to the proud system of speculation that had for a time overshadowed the humble doctrine of his own country, and which his own country itself had repudiated, is installed as a teacher of philosophy in the leading university of Scotland. Sir William entered upon his professorship with every qualification. His personal appearance was the very finest. Above the middle height, of a sinewy and well compacted frame, with a massive head, decisive and finely cut features, a dark, calm, piercing eye, perfect self-possession and reliance, finished courtesy of manners, and a voice remarkably distinct, silvery, and melodious, he stood before you the perfection of a man in every physical adornment. "Whatever," says Mr. Baynes, his class assistant, "the previous expectations of Sir William's appearance might be, they were certainly realized if not surpassed; and however familiar one might afterward become with the play of thought and feeling on that noble countenance, the first impression remained the strongest and the last—that it was perhaps altogether the finest head and face you had ever seen, strikingly handsome, and full of intelligence and power. When he began to read, Sir William's voice confirmed the impression his appearance and manner had produced. It was full, clear, and resolute, with a swell of intellectual ardor in the more measured cadences, and a tone that grew deep and resonant in reading any striking extracts from a

favorite author, whether in prose or poetry—from Plato or Pascal, Lucretius or Virgil, Scaliger or Sir John Davies, whose quaint and nervous lines Sir William was fond of quoting." Though he had already methodized all his views on logic and metaphysics into a system, still he had now to put them into a form suited to academical instruction, and that for very young persons. The difficulty of doing this cannot be easily estimated. Consciousness with all its riddles has to be explained, the phenomena of which are not clustered like constellations in the firmament of thought, as those imagine who think of the mind as a congeries of faculties, but are confluent in all exercises of thought. Even intuition and reflection are not separate elements, but combine in the acts of consciousness. Neither is there pure passivity or pure activity in any operation of mind; but the passive and the active combine in all mental life. Then, again, the subject presents from beginning to end a grand antithesis. The knowing mind and the thing known—and that especially the mind itself—in all the phases of psychological phenomena, present never-ceasing antitheses that are to be made known to the self-consciousness of the pupil, both as contrasts and as unities. This dual character of the phenomena must never be lost sight of in the greatest subtlety of discussion; both the subjective and the objective must ever be realized in the pupil's self-consciousness as he reproduces the thinking of the teacher. To effect all this, not only must the language be so fashioned as to exhibit this duality in separation and in unity, but the whole scheme and order of the lectures must be planned so as to exhibit what in actual thinking is confluent and inseparable, as though they were distinct, and yet realizing at the same time their inseparable character. These syntheses and antitheses must ever be realized in the self-consciousness of the pupil. All these requirements Sir William accomplished in his academical prelections, as his "Metaphysical Lectures," recently published, sufficiently evince. The gradual opening of the subject, the increase of distinctness at each step, the exhibition of the successive phenomena without any commingling of phases, the different orders of discussion determined by the diverse orders of the topics considered, the judicious recapitulations at the beginning of the successive lectures whenever the subject in hand was embarrassed with special difficulties, the apt introduction of the history and polemics in regard to cardinal doctrines, all presented in a flexible, idiomatic, masculine diction, as clear as light, constitute these lectures a masterly academical lesson in metaphysics. As a scheme of discourse to teach young men to philosophize, they seem to be devised with consummate skill. Beside lectures, the class was severely disciplined by examinations, and by writing essays. This two-fold mode of tuition Sir William had, in his letter offering himself as a candidate for the chair,

foreshadowed in these words: "I have only further to repeat, in general, what I have formerly more articulately stated, that in the event of my appointment to this chair, I am determined to follow out my own convictions of the proper mode of academical tuition; that is, I shall not only endeavor to instruct by communicating on my part the requisite information, but to educate by determining, through every means in my power, a vigorous and independent activity on the part of my pupils." His teaching produced the most intense mental activity in the pupil, and fired him with an unquenchable thirst for knowledge; and notwithstanding the commanding authority which his vast erudition, powerful genius, noble person, and wide fame gave to his teaching, he yet so inspired his pupils with the spirit of free thought that they learned to think for themselves even under his imperial eye.—In 1846, 10 years after his election to the chair of philosophy, Sir William published his edition of Reid's works, which was undertaken immediately upon his election, as a book for the use of his class. The impression which it made in Scotland may be inferred from the following extract of a letter from Lord Jeffrey to Mr. Empson, then editor of the "Edinburgh Review": "I have been looking into Sir William Hamilton's edition of Reid, or rather into one of his own annexed dissertations, 'On the Philosophy of Common Sense,' which, though it frightens one with the immensity of its erudition, has struck me very much by its vigor, completeness, and inexorable march of ratiocination. He is a wonderful fellow, and I hope may yet be spared to astonish and overawe us for years to come." These supplementary dissertations, together with his previous writings, at once placed Sir William on the highest elevation. In 1852 Sir William collected his contributions to the "Edinburgh Review," and published them with much original matter, under the title of "Discussions on Philosophy and Literature, Education, and University Reform," and in 1854 another edition greatly enlarged (republished, with an introductory essay by Robert Turnbull, D.D., New York, 1855). The last of his literary labors was his edition of the complete works of Dugald Stewart. He completed the task in 9 volumes, with the exception of a life of Stewart, which has been supplied in an able manner by Mr. John Veitch, one of his pupils, and a coeditor of his "Lectures."—For 10 years Sir William had been enfeebled by a severe paralysis, but yet had never relaxed his labors as a teacher, and only lessened them as an author. He finished his lectures of the session of 1855 and 1856, and distributed the prizes to his class; and after an illness of 10 days, he died at his residence in Great King street. "Notwithstanding," says a private letter, "the gradual increase of his physical infirmities, he suffered no pain, and the mind retained its acuteness, though not its energy, almost to the last." By the world, Sir William was only thought of as the learned man

and profound philosopher; but a letter from one of his family says: "We rarely or never thought of him in these characters, living as he did so simply and quietly in the midst of his family, accepting thankfully our trivial services, and taking a share and interest in all our little domestic pleasures and troubles." The death of Sir William Hamilton cast a shadow, from the firmament of thought, over the civilized world. It was seen that a great luminary had gone down beneath the horizon; and men began to think more earnestly about him, as one of recognized superiority. The facts which have been stated show that he was actuated through life by the noblest motives and the loftiest aims; and his performances seem almost incredible. When he gave to the world his first lesson in philosophy, hardly any of his countrymen understood it; but by his labors as a teacher and writer, his philosophy is now not only understood by thousands, but is influencing all the thoughtful literature of those who speak the English language. As a metaphysician he has never been surpassed. His discrimination between the conditioned and the unconditioned, and correlatively the respective provinces of knowledge and belief, affords the most powerful support that speculation has yet given toward upholding the doctrine of a moral universe. As the inventor and framer of logic, in its true sense, he stands next to Aristotle himself; and as the philosopher of logic, elevating it to the dignity of the science of the laws of thought as thought, he must be placed above Aristotle and the logicians of all ages. As a critic of systems, as a master of the older schools and of the classic sources of speculation, and as a tactician in philosophical polemics, he stands without a compeer in the great historical assembly of philosophers. Though possessed of the most subtle, profound, comprehensive, and aspiring genius, he was yet the most sober of observers, pursuing truth and only truth, never striving after novelty; and his stupendous erudition, instead of shackling the independent vigor of his mind, seems to have been so completely digested and assimilated, as only to nourish his robust mental energy and give it the combined powers of the thinkers of past ages controlled by his own originality. But Sir William's influence upon the age must not be estimated by his philosophy alone. His immense erudition, while it furnished a model for imitation, has quickened the scholarship of the world, by hints which will elicit investigation in the same directions; and in his admirable disquisition on the *Epistola Obscurorum Virorum*, he has given an example which astonished even the Germans. Neither must we overlook his physiological labors. His polemic against phrenology, in the several papers appended to the first volume of his "Lectures," rivals in experimental sagacity any inquiry in human physiology, from John Hunter to Richard Owen. His paper in the "Edinburgh Review," reprinted in the "Discussions," on the

life of his grandfather's friend, Dr. Cullen, deserves notice as evidence of the thoughtfulness with which he had read the history of medical doctrine. Sir William's father and grandfather were professors of anatomy and botany in the university of Glasgow; and their tastes for physiological inquiries descended to him. "The philosopher," says Aristotle, "should end with medicine, the physician commence with philosophy." If this precept were observed, there would be fewer wild speculators in mental philosophy, and fewer physicians who cultivate medicine only as a trade, and are indifferent to all that transcends the sphere of vulgar practice. But the most important of Sir William's writings next to those on philosophy are his papers on educational reform. The decisive power with which, in the "Edinburgh Review," he attacked the abuses which had destroyed the true character of Oxford, and damaged all the other schools of Britain, accompanied as it was by such comprehensive views of what education ought to be, together with such erudite researches into the history of the educational institutions which had nurtured the civilization of Europe, opened the eyes of the British public to their ignoble condition, and has led to the university commissions which are reforming the education of the United Kingdom. There are no papers upon public matters within the whole compass of British history, that for fierceness of hostility, fulness of information, profound intelligence, and resistless dialectic, can be favorably compared with them. Other political papers were directed against matters of shifting policy; but these were about the greatest of all institutions, except the family—the school, where men are educated to truth or error, to a noble and catholic spirit, or to bigotry of sect and party. After examining more particularly the organizations of schools, in a subsequent paper he attacked, with great force of argument backed by overwhelming authorities, a cardinal heresy in education, then lately put forth at Cambridge by Dr. Whewell, viz.: that mathematics is a better logical discipline than logic itself. In other of his writings, Sir William has shown that of all mental gymnastics, the study of the ancient classic languages and logic is, beyond all comparison, the most efficient for broad culture and a harmonious development of man's whole nature.—The historical and doctrinal position of Sir William Hamilton in the progress of philosophy can, in a work like this, be only indicated. The philosophy of Bacon was a recoil against idealism. Observation of the external world was the one great precept of his philosophy, assuming as it did that the external world is distinct from the mind and is real; its whole aim is realism. Locke, in continuing the Baconian movement, inconsistently fell into the common error at that time, that in observation we do not perceive the external world, but only something representative of it. By thus incumbering observation with a false hypothesis repugnant to the validity of obser-

ation, **Locke's** philosophy was pregnant with overt absurdity. Therefore it was that David Hume, in the true spirit of scepticism, accepted the doctrine of Locke and exposed the absurdity which it involved. Hume, in fact, showed that philosophy is either altogether a delusion, or that the doctrine of Locke is erroneous or incomplete. Philosophers were therefore constrained either to surrender philosophy as impossible, or else to ascend to higher principles for defence against the sceptical reduction. Hume thus put philosophy into a dilemma that forms a memorable crisis in the history of speculation. His scepticism awoke the sensualism of Britain and the rationalism of Germany from their respective dogmatic slumbers. It was manifest that the problems of speculation must be considered in new aspects and subjected to a more searching analysis. Reid attempted to rescue British philosophy from the scepticism of Hume. He saw that Hume's reasoning proved that the doctrine of representative perception involved not only the denial of the existence of matter, but, by the fairest sequence, the denial also of the substantiality of mind. He therefore strove to vindicate the unconditional veracity of consciousness, which testifies that we do immediately perceive the external world; and by the analysis of mental phenomena, he established the cardinal doctrine in metaphysics, that what our nature compels us to believe as true and real, is true and real, called the doctrine of common sense. Kant, startled, like Reid, by the scepticism of Hume, strove to connect cause and effect, which Hume had shown, upon the doctrine of sensualism, to be correlated only by succession in nature, and by custom in thought. Kant made causation the central problem of his philosophy, while Reid made external perception the central problem of his. But Kant decided the adverse destiny of his philosophy by his first step. He started with the received doctrine of the day, that we do not immediately perceive external objects, as consciousness testifies; but that what is illuſively seen as the external world is only a modification of our minds, and that reality is only a necessary illusion. Having thus declared consciousness to be untrustworthy, his philosophy ended in making intelligence self-contradictory in its natural and necessary exercise. And as, according to his philosophy, truth consists in the harmony of thought with thought, and not of thought with things, the spirit of his philosophy encouraged the most unexclusive doubt. The doctrine of Kant, that the external world is a necessary illusion imposed on us by a treacherous reason, admitted, however, that there may be a reality corresponding to this necessary illusion. In this aspect his philosophy is a hypothetical realism. But Fichte showed by a rigorous logical analysis that at bottom Kant's philosophy is absolute idealism denying any external world. Consciousness having been repudiated by Kant as a witness, Schelling claimed for the mind an intellectual intuition, which is above consciousness, and

released from the laws of the understanding, and comprehends the absolute by becoming the absolute, and thus knows God by being God; and by this method Schelling conceived that he had explained the knowledge of external reality. Hegel next attempted to solve the problem of existence and of knowledge; and without repudiating consciousness, as Schelling had done, he claimed that by sifting mental phenomena man can rise to absolute knowledge, through a dialectic process which starts from the thesis that being and nothing are the same; and that, so far is contradiction from being an insuperable barrier to intellectual cognition, it is the chief instrument in laying the foundation of our higher knowledge, which in fact ends in the consummate paradox and ultimate truth, that contradictories are one, and universal negativity is the essence of thought. Such were the attempts to solve the problem of knowledge and of existence, and to conciliate the contradictions in human thinking that resulted from the subtle conceptions of Hume, which doubted the existence of any reality. At this crisis in speculation Sir William Hamilton appeared. With an accurate knowledge of all that had ever been written on the central problems of philosophy, he saw that all the errors in speculation resulted from repudiating consciousness as an infallible witness, and ignoring the laws of the understanding in the highest speculation. He saw that Reid was right in his doctrine, that we perceive external realities immediately, because consciousness so testifies; and he directed his energies to develop this doctrine. He also saw that the contradictions in thinking which Kant thought inherent in human intelligence, and which led Hegel into such a monstrous paradox, arise only when intelligence transcends the limits to which its legitimate exercise is restricted, and that within these limits intelligence does not naturally or necessarily contradict itself. He therefore strove to point out the limits or conditions of thought, and to indicate the province of faith, demonstrating that there must be existences in which we must believe though we cannot know them. So that his labor was to bring back philosophy from its aberrations in paradoxes to repose on common sense, declaring that there is certainty in knowledge, there is a real external world which we know immediately, and a moral universe known to us through our moral nature, which implies a moral order and a moral governor of all. Such is the aim and scope of Sir William Hamilton's philosophy.—Many of Hamilton's notes are included in the abridgment of Reid's "Essays on the Intellectual Powers" by Dr. James Walker (Cambridge, 1850). From his notes and dissertations on Reid, and his discussions on philosophy, a volume was arranged by O. W. Wight, entitled the "Philosophy of Sir William Hamilton" (New York, 1858; 3d ed. 1855). A selection of his academical lectures is announced to be published in 1859, edited by Mansel and Veitch. —See notices of Sir William Hamilton in the

"Biblical Repertory and Princeton Review" (Oct. 1855, and Oct. 1859), by the writer of this article.

HAMILTON, WILLIAM GERAUD, an English statesman, known as Single Speech Hamilton, born in London in 1729, died there, July 18, 1796. He was educated at Westminster school and Oxford university, and in 1754 entered parliament as member from Petersfield, Hampshire. On Nov. 18 of the succeeding year he delivered the famous speech which earned him his well known sobriquet. In the opinion of contemporary writers it was unsurpassed as a first effort by any previous parliamentary orator, and the highest expectations were formed of the speaker. Of this speech no copy was ever taken. Contrary to the belief long entertained that this was his solitary oratorical effort, he spoke again in parliament in the succeeding February, with masterly effect, and afterward at least twice in the Irish parliament. His eloquence recommended him to the ministry, and after serving as a lord of trade, he held office for many years in Ireland as principal secretary of the lord lieutenant, and as chancellor of the exchequer. In 1808 a posthumous work by him was published by Malone, entitled "Parliamentary Logic" (8vo., London), which was characterized by Jeffrey as affected and peculiar in style, and deficient in force, perspicuity, and accuracy. Hamilton is among those to whom the authorship of "Junius" has been attributed.

HAMILTON, WILLIAM RICHARD, an English archaeologist, born in 1777, died in 1859. His university education was interrupted by ill health. For some time he was employed in diplomatic capacities in Turkey and Egypt. While in the latter country he secured for the British museum the celebrated trilingual Rosetta stone, which, undaunted by the plague which had broken out among the crew, he seized on board of the ship where the French had concealed it. He displayed the same zeal in regard to the Elgin marbles; having been on board the vessel on which part of them were shipwrecked near Cerigo, he remained in that island several months, and with the assistance of skilful divers succeeded in rescuing those famous works of art from the sea. Soon after his return to England he published "Ægyptiaca, or some Account of the Ancient and Modern State of Egypt" (royal 4to., London, 1810). Mr. Hamilton officiated for many years as under secretary of state for foreign affairs, and as ambassador in Naples. While in Paris with Lord Castlereagh in 1815 he succeeded in bringing about the restoration to Italy of the works of art which the French had seized on various occasions. His exertions were highly appreciated by the Italians, and above all by his friend Canova. He was one of the founders and for several years president of the London royal geographical society, and one of the trustees of the British museum from 1838 to Feb. 1858, when his fail-

ing health compelled him to resign his trust. His enlightened sympathies with the fine arts and his scholarly attainments were felt in many other literary and artistic associations of England, to which he ever proved a faithful friend.

HAMILTON, SIR WILLIAM ROWAN, a British geometer and natural philosopher, born in Dublin, Aug. 4, 1805. He gave early indications of extraordinary intellectual powers. At 3 years of age he was consigned to the care of his uncle, the Rev. James Hamilton; at 4 he had made some progress in Hebrew; in the two succeeding years he had acquired the elements of Greek and Latin, and when 13 years old he was in different degrees acquainted with 13 languages, beside the vernacular, including Syriac, Persian, Sanscrit, Hindoostanee, Malay, French, Italian, Spanish, and German—the oriental languages having been taken up preparatory to a career in the East. At 14 years of age he addressed a letter of greeting in the Persian language to the Persian ambassador, Mirza Abou Hassan Khan. Falling in with a Latin copy of Euclid when 10 years old, he soon became interested in geometry, and at 13 he was fully confirmed in his taste for algebra. About this time he had some arithmetical contests with the American prodigy, Zerah Colburn, then exhibiting in Dublin, in which, as Sir William afterward acknowledged, his competitor was usually the more expert. He studied the *Arithmetica Universalis* and the *Principia* of Newton, and the *Mécanique céleste* of Laplace, while in his 18th year, and about the same time entered upon his investigations in optics. In 1823 he entered the university of Dublin, where he at once gained the first place, and at every quarterly examination obtained the chief honor in science and the classics. In 1827, while still an undergraduate, he was appointed Andrews professor of astronomy in the university and astronomer royal of Ireland. Hamilton had for a rival claimant for this position Mr. Airy, the present astronomer royal of England; he succeeded his friend and instructor Dr. Brinkley, who was promoted to the bishopric of Cloyne. He has since that time resided at the observatory at Dunsink, near Dublin. In 1837 he was elected president of the royal Irish academy, against the competing claims of the archbishop of Dublin and of Professor Lloyd. The honor of knighthood was conferred upon Mr. Hamilton by Lord Normanby, lord lieutenant, at the meeting of the British association for the advancement of science at Dublin in 1835, when the former held the post of secretary, and delivered the annual address. Sir William R. Hamilton has engaged in numerous investigations on scientific subjects, published in the "Transactions" and "Proceedings" of the royal Irish academy and royal society, in the "Proceedings" of the British association, in the "London and Edinburgh Philosophical Magazine," &c. As a lecturer in his chair he has been eminently distinguished. In 1838 he published in the "Transactions" of

he royal Irish academy an "Essay on the Theory of Systems of Rays," the germ of which was read to the academy Dec. 8, 1824, by Dr. Brinkley, the president, who acted as its sponsor, under the title of a paper on "Caustics." In this essay Hamilton accomplished for optics what Descartes has done for geometry and Lagrange for mechanics—that is, the application of algebra, including the differential calculus, to those problems in the science of optics which spring from the hypothesis of transverse vibrations, or what is more generally called the undulatory theory of light. By a peculiar analysis, developed in this theory, he generalized the most complicated cases of common geometrical optics; and his prediction of the most singular and critical of all the results of Fresnel's theory, the conical refraction in biaxial crystals, amply rewarded his labors. His friend Dr. Lloyd, of Trinity college, Dublin, verified this result in the case of aragonite, which is a biaxial crystal; he found the position, dimensions, and conditions of polarization of the emerging cone of light to be exactly such as Hamilton's prediction assigned. Airy has designated it as "perhaps the most remarkable prediction that has ever been made;" and Professor Plücker of Bonn said of it: "No experiment in physics ever made such an impression upon my mind as this of conical refraction." Sir William received the Cunningham gold medal from the royal Irish academy, and the royal gold medal of King William IV. from the royal society of London. In 1834 he published two papers in the "Philosophical Transactions" of the royal society of London, "On a General Method in Dynamics, by which the study of the motions of all free systems of attracting or repelling points is reduced to the search and differentiation of one central relation or characteristic function." Of the value of these papers we can give no higher conception than to mention that Jacobi translated largely from them, and accompanied his translations with copious comments. The last and most elaborate of Hamilton's writings is his "Method or Calculus of Quaternions" (8vo., Dublin, 1853), which formed the subject of successive courses of lectures delivered in 1848 and subsequent years, at Trinity college, Dublin. The three leading traits of the author's mind, originality, generalization, and intellectual independence, are conspicuous in this work. Hamilton aimed to show that "expressions which seem, according to common views, to be merely symbolical and quite incapable of being interpreted, may pass into the world of thoughts, and acquire reality and significance, if algebra be viewed, not as a mere art or language, but as the science of pure time." The fundamental geometrical view, adopted and developed in the "Lectures," is that according to which a quaternion is considered as the quotient of two directed lines in tridimensional space; and the motive (in this view) for calling such a quotient a quaternion, or the ground for connecting its

conception with the number four, is derived from the consideration, that while the relative length of the two lines compared depends only on one number, expressing their ratio, their relative direction depends on a system of 3 numbers—one denoting the angle between the 2 lines, and the 2 others determining the aspect of the plane of that angle, or the direction of the axis of the positive rotation in that plane.

HAMILTON COLLEGE, an incorporated literary institution situated in Clinton village, Kirkland township, Oneida co., N. Y., 9 m. S. of Utica. Its origin is due to the generosity of the Rev. Samuel Kirkland, who was a missionary for more than 40 years among the Oneida Indians. In 1798 the "Hamilton Oneida Academy" was incorporated through the influence of Mr. Kirkland, who presented its trustees with the title deed to several hundred acres of land. This academy existed 18 years, and was very prosperous. With the rapid growth of settlements in its neighborhood, the demand grew up for a higher institution. The charter for Hamilton college was obtained in 1812, after the death of Mr. Kirkland, which happened in 1808. Dr. Azel Backus, a Congregational clergyman, distinguished in Connecticut as a preacher and scholar, was chosen the first president. He died in 1817, and was succeeded by Dr. Henry Davis, whose administration, covering a period of 16 years, was marked by the extremes of prosperity and depression; he resigned in 1832. The 8d president, Dr. Sereno E. Dwight, a son of Timothy Dwight, held the office only 2 years; and the 4th, Dr. Joseph Penney, held it 4 years. The 5th president, Dr. Simeon North, a graduate of Yale college, was called to this office in 1839, after holding the classical professorship 10 years. During his long and quiet term of service 485 students were graduated in 19 classes. His successor, Dr. Samuel W. Fisher, also an alumnus of Yale college, received his election in July, 1858, and in the following month entered upon the presidential duties. The law department, endowed by the Hon. Wm. H. Maynard, and occupied by Prof. T. W. Dwight, is already an attractive professional school. The college has cabinets of minerals, fossils, and shells, containing 18,000 specimens, and an observatory, recently completed, at a cost of \$15,000, with a large telescope. The productive funds of Hamilton college, including the Maynard and Dexter professorships, amount to nearly \$90,000.

HAMLET, or AMLETH, a prince of Denmark, whose name occurs in the mediæval histories, particularly that of Saxo Grammaticus, although nothing is known of the period when he lived; some place it as early as 5 centuries B. C., others as late as A. D. 700. According to Saxo Grammaticus, he was the son of Horvendill, hereditary prince of Jutland, and of Gerutha, daughter of Roric, 15th king of Denmark after Danus. His story, as related by this author, is substantially the same as that which Shakespeare adopted as the basis of his tragedy of "Hamlet;" it was republished with some



modifications by a French writer named Belleforest, whose work, translated into English with the title of the "Historye of Hamblet," undoubtedly fell under the eye of the great dramatist. According to some historians, Hamlet was king of Denmark for several years; but the best modern authorities suppose that no such person ever existed.

**HAMMARSKÖLD, LARS**, a Swedish author and critic, born in Tuna, April 7, 1787, died Oct. 15, 1827. He received his degree as doctor of philosophy at Upsal in 1812, and is the author of several poetical and critical writings, the most esteemed of which are his work on the progress and development of philosophical studies in Sweden, and especially that on Swedish literature (*Soenska Vitterheten*, Stockholm, 1818-'19; 2d ed. revised and enlarged by Sonden, and an edition comprising the literary period between 1810 and 1882, prepared by the latter in 1888). He rendered further services to Swedish literature by preparing editions of the posthumous works of Stjernhjelm (1818), and of Stagnelius (1824-'6).

**HAMMER**, a tool employed for impressing the surface of bodies, moulding them into various shapes, or driving them forward. The force communicated to the bodies is the result of the momentum of the hammer, which is set in motion either by gravity, muscular action, or both combined. The tool is a weight, commonly of iron, and usually attached to the end of a handle or helve, by which it is worked. Wooden hammers are distinguished by the name of mallets. Hammers are of universal use; they are employed in all trades, and made of the greatest variety of forms and sizes. Those designed for beating down the ends of the small rivets used in jewelry may weigh but a small part of an ounce; while those employed for shaping massive work in wrought iron, as the shafts of steamboats, are made of 8 or 10 tons weight. (See *FORGE*.) Hammers intended to produce an effect limited to the surface of bodies, as in riveting and clipping off edges of stone, are furnished with elastic helves, which cause them immediately to rebound; but those intended to crush or affect the texture throughout of the bodies to which they are applied are furnished with stiff helves. To the smith the hammer is the most important of all tools, and he employs it in a variety of forms. A few of the principal of these are: the hand hammer, of size and weight convenient to be used with one hand; the up-hand sledge, used with both hands, but seldom raised above the head; and the about sledge, swung at arm's length with both hands at the extremity of the handle. There are numerous others with the face or striking surface adapted to produce certain forms or accomplish special effects. The hammers used in stone quarrying and mining are also of various forms, some with sharp edges for chipping, others like the blacksmith's sledge to give heavy blows, small hand hammers for driving hand drills, and the regular striking hammer or "mallet" of the Cornish miner, of

cuiboidal form, weighing 7 or 8 lbs. By the Americans these were first made wholly of cast steel, instead of facing with steel after the English practice. This hammer is swung with the full force of both hands, and is used exclusively for driving the steel drills, which are held in place by another workman. Hammers are much employed for forcing metallic plates into dies, to give them the form of the die. Where a simple object, as a bolt or rivet, is to be many times repeated, half of the die or a swage tool is set in the face of the hammer and the corresponding half in the anvil, and the hammer is arranged so as to be brought down always in the same place. This is effected in the form called the lift hammer (of which the best is that known as the "Oliver"), which is worked by the foot pressing down upon a treadle. This, by a chain reaching up to a short arm of a horizontal axis, causes the arm to turn, bringing down the hammer, which with its handle constitutes a long arm of the same axis. The chain continues up to the end of a fixed horizontal spring pole, and this by its reaction turns the axis back again, raising the hammer as the pressure of the foot is taken off.—In forges and machine shops hammers are required too large and heavy to be wielded by hand. Of these several kinds are employed, as the forge or helve hammer, the tilt hammer, and the steam hammer. The first of these were formerly heavy heads of cast iron secured at one end of a strong wooden beam, which served as the shaft or helve, and which moved upon an axis at the opposite extremity from the head. The hammer was raised by cams upon a wheel revolving in such position, that these passed in succession beneath the shaft, lifting it together with the hammer. An improvement upon this was to substitute cast iron for the wooden helve, and make this the principal part of the weight of the hammer. The head is a piece forged out of wrought iron and faced with steel, fitted into the helve and secured with wedges. The pane is sometimes grooved, as is that of the anvil corresponding to it; this is for better nipping and compressing bolts of iron in the process of shingling. Such hammers and their anvils are placed upon substantial beds of timbers, and these upon mason work of heavy stones. The hammers weigh from 4 to 10 tons or more. They are usually raised by cams fixed in the heavy iron collar of a wheel, which is set so as to revolve under the end that projects beyond the anvil, called the nose of the hammer. These raise the hammer 16 to 24 inches at the rate of 75 to 100 times in a minute. A contrivance is provided by which the hammer is kept up whenever required. It will be noticed of the forge hammer that its face is parallel to that of the anvil only when it rests upon this; that it must in consequence of moving in a circular arc be applied at different angles to the body placed upon the anvil, according to the thickness of this body; and that when nearly as thick as the space through which the hammer is

sted, the force of the blow is in great measure lost. Moreover, there is no method of regulating the pressure or adapting it to the kind of work required. A considerable part of the motive power also is lost in the gearing, and two thirds of the effect, it is stated, by the manner in which the hammer is supported; while the machinery is much in the way, being necessarily close to the hammer. These serious inconveniences are entirely done away with in the steam hammer, to be presently noticed.—Tilt hammers are of much lighter construction than the forge hammer, and are made to work with great rapidity. They are employed to advantage in giving the finish to bars of cast steel, which have been drawn down to small size from the ingots under the larger forge hammers. They are also well adapted to swaging car axles, &c. Several contrivances are in use for giving to them a rapid motion. In some the helve is extended beyond the axis of motion, so as to make there a short arm of a lever, of which the hammer end is the long arm. The short arm, describing a small arc, may be rapidly struck in succession by a large number of cams upon a wheel placed upon this end. As the short arm is thus forced down the hammer is lifted through a larger arc in the same time, and thus heavy blows are obtained in quick succession. Or, the hammer is raised by the cams lifting the shaft between the axle and the hammer, while under the short tail end is fixed a spring beam, which reacts as it is struck, throwing the hammer end violently down. The spring is also sometimes placed over the hammer head, springing it back as this is raised against it.—The most perfect of all hammers, by which the objections to the forge hammer are completely obviated, and the largest pieces of iron can be forged with rapidity and accuracy, is the direct action steam hammer, invented by Mr. James Nasmyth of England. The French claim its invention for M. Schneider of Creusot, who patented a machine upon the same principle, April 19, 1842, while the patent of Mr. Nasmyth was effected June 9 of the same year. The hammer, however, has been generally recognized as Nasmyth's. To explain this admirable piece of mechanism drawings would be essential, and without them only a general idea can be given of its character and capacity. The leading feature in the machine is the attaching of the hammer to the end of a piston rod, which works vertically as steam is let into the lower end of the cylinder above and then is allowed to escape from it. The hammer block is an oblong square mass of iron of any weight from  $1\frac{1}{2}$  to 10 tons or more. It is grooved on its sides to work in slides upon the two massive cast iron standards which form the framing of the machine, and upon the top of which is the cap or entablature that binds the two together and supports the steam cylinder. About 6 feet above the ground the two standards spread out so as to leave abundant space between their base and the great iron anvil block imbedded between them. In the

centre of this block is set the anvil, directly under the pane of the hammer. The standards are bolted down upon a massive iron plate, which extends across under ground by the side of the anvil block. The lift of the hammer depends upon the length of the steam cylinder; and as this is sometimes 7 or 8 feet, blows are obtained by the heavy mass of iron falling through this distance, such as never before could be controlled for any useful purpose. The whole momentum, saving the slight loss by friction, is directed entirely to the work to be effected. The parallelism of the hammer face and the anvil face greatly facilitates the production of accurate results, while the space through which the hammer may be lifted admits of the introduction of pieces of any thickness between it and the anvil. The movements are wonderfully controlled by the simple opening and shutting of valves, the management of which involves no labor. The ponderous mass vibrates up and down, balancing upon its springy cushion of steam, now tapping gently in rapid blows, such as might serve to shape a horse-shoe nail or crack nuts without injury to the kernel, and again is lifted the whole height of the stroke by the full rush of steam under the piston, falling as the vapor is suddenly allowed to escape with a crushing force, that gives shape to the largest masses of wrought iron. To prevent the piston from being driven against the head of the cylinder, a series of holes are made around the upper part of this, which connect with the waste pipe for the escape of the steam; as the piston passes above these holes, a portion of the steam finds an outlet through them, and the air or steam that was above them becomes the most perfect elastic spring, giving a powerful impulse by its reaction to the hammer, as the upward motion of this gives place to a descending one. The efficiency of this hammer and the peculiar advantages gained by its use are well shown in its application to shingling balls from the puddling furnace. The soft glowing mass of iron brought to the hammer requires at first a comparatively gentle pressure to squeeze out the cinder from the external portion and render it more compact. The hammer is at first gently let down upon it with a slight fall, and as the iron is condensed into a more solid block, the force of the blows is increased, till the cinder and impurities are forced out from every portion. The point of greatest difficulty about the machine is in securing the piston rod to the hammer block. The inventor was aware that this joint could not be a solid unyielding one, as the piston rod itself would act as a hammer and soon destroy any of the usual modes of fastening. He formed a cylindrical recess in the top of the hammer block, placing under this a pile of bits of hard wood, which by their slight elasticity served to break the force of the blow, as the cartilage in the joints of the limbs answers a similar purpose. The lower end of the piston rod terminated in a knob or button, and when this was brought

down upon the wood it was covered by other similar pieces, which were firmly secured in place by iron keys passed through the head of the block. The largest hammer ever constructed was one of this class made in 1859 at the Mersey steel and iron works at Liverpool, which it is stated combines various improvements on those which have been hitherto in use. Its weight is 82 tons 15 cwt.; its total height about 28 feet; and the total weight of metal in the apparatus about 70 tons. A steam hammer was constructed at the Washington navy yard with only one standard, thus leaving the anvil open nearly all round.

**HAMMER-PURGSTALL, JOSEPH VON**, a German orientalist, born in Gratz, Styria, July 9, 1774, died in Vienna, Nov. 24, 1856. He studied the Arabic, Persian, and Turkish languages at the oriental academy of Vienna, and, after passing 8 years in Dalmatia and in travel, went in 1799 to Constantinople to assume the post of interpreter to the inter-nuncio Herbert. In the following year he was charged by government with the duty of preparing a report upon the condition of Syria and Egypt, and of inspecting the consulates in the Levant. In 1801 he engaged in the Egyptian campaign as secretary-interpreter of the Anglo-Turkish generals, taking part in the conference of the grand vizier at Jaffa, and in the surrender of Alexandria. He subsequently visited England. In 1802 he was again sent to Constantinople as secretary of legation, and in 1806 was appointed diplomatic agent at Jassy in Moldavia. He returned to Vienna in 1807, which he never again left except for short journeys. In 1810 he was attached to the embassy that went to Paris to assist at the nuptials of Maria Louisa, and in 1815 was sent there again to receive back the oriental MSS. which had been carried thither after the capture of Vienna in 1809, and on his return was offered the place of custodian of this collection, which he declined. In 1816 he was appointed interpreter to the court, and in 1817 aulic councillor. Inheriting the estate of the counts of Purgstall in 1837, he added that name to his own, and was created a baron. He was a friend in youth of Wieland, Goethe, Herder, and of Johannes von Müller, who suggested to him the idea of writing his principal work, the "History of the Ottoman Empire." His large fortune enabled him to devote himself to severe study, living a life of extreme temperance and indefatigable labor. He spoke and wrote 10 languages, but it has been said that his philological learning was extensive rather than profound, and his works have been criticized as inaccurate and superficial; his narratives are diffuse, and his style is deficient in clearness. He replied with good temper to these and other severe criticisms, preserving the most friendly relations with his critics, and with the literary world, which loaded him with its honors. His works, upon the whole, are among the most valuable authorities upon oriental history and literature. His care

in the references to his authorities renders it easy to correct the errors into which he has fallen. His writings in several languages, including his contributions to the journals of various literary and scientific bodies, would make more than 100 octavo volumes, his only unfinished works being those in which he was interrupted by death. Among his chief works are his *Geschichte der schönen Redekünste Persiens* (1818); *Geschichte des Osmanischen Reichs* (10 vols., Pesth, 1827-'35); *Geschichte der Osmanischen Dichtkunst* (10 vols., 1836-'8); *Literatur-Geschichte der Araber* (7 vols. 4to, Vienna, 1850). A posthumous autobiography, *Denkwürdigkeiten aus meinem Leben*, and others of his posthumous writings, are now in process of publication under the auspices of the councillor Auer, director of the imperial printing establishment of Vienna.

**HAMMERICH, FREDERIK PEDER ADOLF**, a Danish author, born in Copenhagen, Aug. 9, 1806. He is the son of a merchant, studied theology and philosophy at the university of his native city, travelled extensively in Scandinavia and Italy, and published in 1840 his spirited *Scandinaviske Rejseminder* ("Scandinavian Travelling Reminiscences"), which contains many national songs and lays. At about the same period he published an interesting historical sketch of the city of Rome. His delicate health inducing him to relinquish a pastoral office which he had held since 1839, he devoted himself to lecturing on the civil and ecclesiastical history of Denmark, and in rapid succession appeared his *Christian II. i Sverige og Karl X. Gustav i Danmark* ("Christian II. in Sweden, and Charles X. Gustavus in Denmark," Copenhagen, 1847); *Danmark i Valdemarsnes Tid* ("Denmark in the Time of Waldemar," 1847-'8); and *Danmark under de nordiske Egens Forening* ("Denmark under the Northern Union of States," 1849). In 1845 he became pastor of Trinity church at Copenhagen. He was one of the most spirited champions of the cause of Denmark during the Schleswig-Holstein war, served in the campaigns of 1848-'50 as chaplain, and has written sketches of the war which became very popular. Upon the restoration of peace he resumed his clerical functions in Copenhagen, and has founded there a society for the promotion of Danish ecclesiastical history. He has also taken part in the preparation of a book of canticles for the Danish church, which appeared at the end of 1852. In the same year were published his "Scriptural and Historical Songs," which had been preceded by various other poems, one of which celebrates the genius of Thorwaldsen, while another and the best of them sings the glories of Gustavus Adolphus.

**HAMMERSMITH**, a village of Middlesex, England, on the Thames; pop. in 1851, 13,463. It has a handsome suspension bridge across the river, many elegant houses and villas, a grammar school endowed by Bishop Latimer, with an annual revenue of £800, several churches

and charitable institutions, and a Catholic school and nunnery established in the reign of Charles I. The vicinity is chiefly occupied by nurseries, and extensive market gardens, which supply the metropolis with flowers and vegetables.

**HAMMOCK** (Sp. *hamaca*), a hanging bed, suspended from trees, posts, or hooks. The naval hammock is a piece of stout canvas, about 6 feet long and 3 feet wide, gathered at the ends, and slung horizontally under the deck. In a ship of war a space of from 14 to 20 inches in breadth is allowed to each hammock. Previous to battle, the hammocks and beds are carried on deck and arranged so as to give protection against small shot. The Indian hammock is a net made of strong cord, terminating with small ropes to suspend it. The term is of Indian origin. Columbus, in the narrative of his first voyage, mentions as articles of barter the *hamacas* or nets in which the Indians slept.

**HAMMOND**, HENRY, an English ecclesiastic, born in Chertsey, Surrey, Aug. 18, 1605, died at Westwood, Worcestershire, April 25, 1660. He was chaplain to Charles I. during his imprisonment at Woburn, Caversham, Hampton Court, and the Isle of Wight. Beside a number of controversial writings and tracts, he left a "Paraphrase and Annotations upon all the Books of the New Testament" (fol., London, 1702). His life was written by Bishop Fell of Oxford (8vo., 1661), and his works were collected and published by his amanuensis Fulman (4 vols. fol., 1684). His sermons and minor works are reprinted in the Oxford "Library of Anglo-Catholic Theology."

**HAMMOND**, JAMES HAMILTON, a U. S. senator from South Carolina, born in Newberry, S. C., Nov. 15, 1807. His father was a native of Massachusetts, and a graduate of Dartmouth college, who became professor of languages in South Carolina college. The son was graduated at that institution, studied law, was admitted to the bar in 1828, and in 1830 became the editor of a political journal in Columbia, which maintained the doctrine of state rights, and advocated nullification in respect to the tariff act of congress. In 1831 he married a lady of large fortune, and retiring from law, devoted himself to agriculture and politics. He entered zealously into the nullification contest which then divided the state, and became a member of the military family of Gov. Hamilton, and subsequently of Gov. Hayne. He wrote much, made many public addresses in behalf of nullification, and took an active part in organizing the military force which South Carolina raised in 1833 to resist the federal government. He was elected to congress, and took his seat in 1835. He declined a reelection on account of ill health, and made a visit to Europe, where he remained upward of a year. In 1841 he was elected general of brigade, and in 1842 governor of South Carolina. While in this office he exerted himself to improve the educational and military institutions of the state, and it was under his auspices that the West Point system of instruction was adopted in her mili-

tary colleges. While governor of the state he published in 1844 a letter to the Free church of Glasgow on slavery in the United States, and in 1845 two others in reply to an anti-slavery circular issued by Thomas Clarkson, the English abolitionist. These letters, in connection with other essays on the same subject, were published at Charleston, S. C., in 1858, in a volume entitled "The Pro-Slavery Argument." Mr. Hammond has published at various times several discourses or essays on agriculture, manufactures, banks, and railroads, and on literary topics. He has also written an elaborate review of the life, character, and public services of John C. Calhoun. In Nov. 1857, he was elected to the senate of the United States to fill the vacancy occasioned by the death of A. P. Butler. In March, 1858, he made a speech in the senate, which excited much comment by the manner in which he spoke of the laboring classes of society in the United States. During the recess of the senate, on Sept. 15, 1858, he made at Columbia an elaborate speech on public affairs, from which it appears that he has abandoned the extreme nullification opinions of his early life, and is opposed to the reopening of the slave trade.—MARSH C. M., brother of the preceding, an American officer and military writer, born in Newberry, S. C., Dec. 13, 1814. He was graduated at West Point in 1836, served 2 years in the Seminole war and in the Cherokee difficulties of 1838, was stationed for 3 years at Fort Gibson, Ark., and was again sent to Florida, where on account of ill health he resigned his office in 1842. Becoming a planter in Georgia, he devoted himself zealously to agriculture, on which he wrote many papers. He was mainly instrumental in forming the agricultural society in Barker co., before which he delivered an annual oration. He was employed in the army under Polk's administration in Texas and Louisiana, but, suffering from a sun-stroke, was again compelled to resign. In 1849 he began a series of contributions to the "Southern Quarterly" on the conduct, character, and general management of the war in Mexico, which he discussed from a purely military point of view. This body of papers, amounting to about 600 octavo pages, constitutes perhaps the most elaborate specimen of military criticism that has been written in the United States. In 1852 Col. Hammond was the president of the board of visitors at West Point, and delivered an oration at the request of the cadets, which was published. He is now a resident of Athens, Ga., and is understood to have made a new translation of Jomini's famous work on the art of war, and to be engaged on a similar work, wholly original, which is to treat the peculiar characteristics of the United States from a military point of view.

**HAMMOND**, LE ROY, a colonel of infantry in the war of the American revolution, born in Richmond co., Va., about 1740, died about 1800. He removed in 1765 first to Georgia, and then to South Carolina, and engaged in

trade as a tobacco merchant. He was an early partisan of the republican cause in the revolution, and took up arms against the loyalists, acting as colonel in the service of the provincial congress under the command of Gen. Williamson. He was engaged in the famous "snow campaign," and contributed by his sagacious counsels to its fortunate termination. In Williamson's campaign against the Cherokees in 1776, he saved the army by a daring and independent action, rallying the troops while under a panic, charging with the bayonet the thickets which harbored the Indians. In the continued invasion of the fastnesses of the Cherokees, he was especially conspicuous. He was employed subsequently on several occasions both by the continental congress and that of South Carolina as Indian agent, and in conciliating and concluding treaties with the red men. In 1779, when the British resumed active operations in South Carolina, he took the field with his regiment, was conspicuous in the battle of Stono Ferry, and after the fall of Charleston adopted, like Sumter, Marion, Pickens, and others, a desultory warfare, and was in perpetual conflict with the loyalists, British, and Indians. In 1780 he was united in movement with Col. Clarke of Georgia; in 1781 was at the siege of Augusta; thence he proceeded to that of Fort Ninety-Six under Greene; and after Greene's failure he served with his regiment under Pickens. After the battle of Eutaw, the last of the battles of large armies in South Carolina, he entered actively into the guerilla warfare which on both sides was substituted for them. In the incessant marches, skirmishes, and surprises of this comparatively independent service, and as a commander of light troops, Col. Hammond acquired the highest reputation as a sagacious and bold scout and strategist. He engaged anew in commercial affairs at the close of the revolution.

**HAMMOND, SAMUEL**, an American revolutionary officer, born in Richmond co., Va., Sept. 21, 1757, died at Horse Creek, near Augusta, Ga., Sept. 11, 1842. After his preparatory studies, it was designed that he should complete his education in England; but his impulses led him, while a mere boy, to volunteer in the wars of the Virginia frontier with the Indians, where he is said to have greatly distinguished himself, and to have acquired that skill in stratagem which marked his subsequent military performances. In 1775 he raised a company, and took part in the battle of Longbridge; and in 1779 he was at the battle of Stono Ferry, S. C. After the fall of Charleston he kept the field with a small cavalry force, pursuing the active partisan warfare which alone maintained the revolutionary cause in South Carolina. He distinguished himself in the actions at Cedar Springs, Musgrove's Mill, Ramsay's Mills, King's Mountain, Guilford Court House, Cowpens, Blackstock, and Eutaw. He participated in the siege of Augusta in 1781, and in numerous skirmishes with the Tories and British acquired the reputation of an accomplished cavalry officer. He sub-

sequently settled in Georgia. In 1793 he was chosen to the command of a regiment against the Creek Indians; in 1802 was elected to congress from Georgia; in 1805 was appointed by Jefferson to the civil and military command of upper Louisiana; and in 1824 removed to South Carolina, where he became surveyor-general of the state in 1827, and secretary of state in 1831.

**HAMPDEN**, a S. W. co. of Mass., bordering on Connecticut, intersected by the Connecticut and drained by Westfield and Chicopee rivers; area, 870 sq. m.; pop. in 1855, 54,849. It has a rough, hilly surface, and a fertile soil, the river valleys being particularly rich. The agricultural productions in 1855 were 1,495 bushels of wheat, 220,412 of Indian corn, 78,744 of oats, 810,648 of potatoes, 45,924 tons of hay, 729,687 lbs. of butter, and 381,791 of cheese. There were 6 grist mills, 24 cotton and 12 woollen factories, 5 forges, 6 furnaces, 10 manufacturing of machinery, 4 of agricultural implements, 2 brass foundries, 8 paper mills, 3 powder mills, 21 tanneries, 11 newspaper offices, and 92 churches. Small steamboats navigate the Connecticut to Springfield, the capital, and the county is traversed by the New Haven, Hartford, and Springfield, the Western, the New Haven and Northampton, the Connecticut river, and the New London, Willimantic, and Palmer railroads, and by the Hampshire and Hampden canal. Organized in 1812, and named in honor of John Hampden, the English patriot.

**HAMPDEN, JOHN**, an English statesman, born in London in 1594, died in Thame, June 24, 1643. He was the son of William Hampden, a member of Queen Elizabeth's parliament, and Elizabeth Cromwell, aunt of the protector. His father left him large estates, and after studying at Oxford, he was admitted a student of the Inner Temple in 1618. His classical attainments were also very considerable, and it was at one time in contemplation to offer him the charge of educating the prince of Wales. In 1619 he married Elizabeth Symeon. His mode of life up to this period had been somewhat gay, "from which," says Clarendon, "he suddenly retired to extraordinary sobriety and strictness, and to a more reserved and melancholy society." On Jan. 30, 1621, he took his seat in parliament as member for the borough of Grampond, Cornwall. In the first parliament of Charles I. he sat for Wendover. He had not hitherto taken any prominent part in public affairs; his attention had been given mainly to the details of parliamentary business and to the local interests of his own country. But when the king, after the angry dissolution of two parliaments (1625 and 1627), attempted to raise money by a forced loan, apportioned among the people according to a previous rate of assessment, Hampden positively refused to lend a farthing, and was imprisoned. His example was followed by about 80 other landed gentlemen, who were also arrested, while recusants of a lower rank were pressed into the fleet or forced to serve in the army. The king and his

overnment rushed blindly on. A new parliament was summoned; and Hampden, having been liberated, was immediately reelected for Wendover. The king granted in exchange for subsidies his consent to the "Petition of Right," binding himself to raise no taxes without consent of parliament, and to imprison no man except by legal process. Other concessions, almost equally important, were also wrung from the king. During a recess of the parliament, Charles grossly violated his pledges. The commons reassembled, protested loudly, were dissolved, and several eminent members were imprisoned. Hampden retired to rural life, and devoted himself to literary pursuits. Eleven years passed without a parliament; the royal promises were unscrupulously violated, and the Puritans were persecuted. Among other arbitrary measures, Charles resorted to a scheme for raising revenue which completed the alienation of the people from the throne. Ship money, a tax which the maritime counties had sometimes paid in time of war instead of furnishing ships for the navy, was now, in time of peace, demanded from the inland counties. Hampden, the first to resist the forced loan, was also one of the first to resist this unjustifiable proceeding, and resolved to bring to a solemn hearing the great controversy between the people and their oppressor. Toward the close of the year 1636 the cause came on in the exchequer chamber before the 12 judges, 7 of whom pronounced against the disputant. The only effect of the decision of this small majority was to exasperate the temper of the people. Strafford meanwhile declared that Hampden should have been whipped into submission; and so intense became the hatred of the king's counsellors, that the person of Hampden was scarcely safe. This decision of the exchequer chamber placed the property of every individual at the disposal of the crown. The persecuted party felt that there was no alternative but to seek their homes in other countries; but an order was issued, April 6, 1638, prohibiting shipmasters from carrying passengers from the kingdom without special license. It has been said that Hampden and his cousin Oliver Cromwell had taken passage in a ship ready to sail for America, when they were stopped by this decree; but the statement is now considered doubtful. The Scottish rebellion followed, and the expenses of the war rendered it imperative for the king to obtain larger supplies. A parliament was summoned to meet in April, 1640, and Hampden was returned for Buckinghamshire. He took lodgings in Gray's Inn lane, living in close intimacy with the other leaders of the opposition. He was at this time beyond doubt the most popular man in England. Charles demanded money under the usual solemn assurances of rectifying late misdoings, but his word was not trusted, and he dissolved the parliament with an angry speech. Ship money was exacted more rigorously than ever. Forced loans were again resorted to, and no possible expedient by

which money could be wrung from the people against all law was left untried. The Scottish army, probably by the advice of Hampden, advanced into England, and put Charles's troops to flight. In their success, as tending to the further embarrassment of the king, he placed his best hopes of restoring liberty to his own countrymen. Charles made a truce with the victors, and summoned another parliament, known as the long parliament. Hampden sat for his old constituents, and by universal consent was the member who exercised a paramount influence alike over legislature and people. Strafford and Laud were immediately impeached and imprisoned. Hampden was one of the committee of 12 to conduct the memorable trial which led to Strafford's execution. It does not appear, however, that he took part in this business, after the house changed the method of proceeding by introducing a bill of attainder; although, in the opinion of Lord Nugent, "he probably considered the bill which took away the life of Strafford as a revolutionary act undertaken for the defence of the commonwealth." Meanwhile he was one of the 5 members accused of treason, whose persons were demanded by the king. "From this moment," says Clarendon, "his nature and carriage seemed fiercer than before." He was made a member of the committee of public safety, and the power of the sword being at length asserted, he prepared to take the field as a soldier. The king raised his standard against the parliament troops at Nottingham, Aug. 22, 1642. Hampden commanded a regiment of volunteer infantry, which he had raised in his native county, and was so distinguished by his intrepid conduct in the succeeding movements, that a wish was expressed that he should take command of the whole army. On the evening of June 17, 1643, Prince Rupert set out for Oxford with 2,000 men, on one of his expeditions. Hampden hastened with a body of volunteers to intercept his return, and overtook the enemy at Chalgrove. A fierce skirmish ensued, and in the first charge Hampden was struck in the shoulder by two balls, which broke the bone, and lodged in his body. After 6 days of acute suffering he expired, uttering with his latest breath a prayer for England.

HAMPDEN SIDNEY COLLEGE, an institution of learning in Prince Edward co., Va., about 68 m. W. by S. from Richmond, under the charge of the Presbyterians. It was founded in 1776, and in 1858 had 5 professors, 119 students, and libraries containing about 5,000 volumes; and its whole number of alumni was 364. Its corporation consists of 27 members. The Presbyterian (O. S.) union theological seminary was established near this college in 1824, and had in 1858 4 professors, 21 students, and a library of 4,600 volumes.

HAMPSHIRE. 1. A W. co. of Mass., intersected by the Connecticut river, and drained by several mill streams, among which are the head waters of Chicopee and Westfield rivers;

area, 524 sq. m.; pop. in 1855, 85,485. Its surface is irregular, and in some parts mountainous; the soil, especially near the Connecticut, is very fertile. The productions in 1855 were 5,557 bushels of wheat, 291,189 of Indian corn, 74,516 of oats, 818,756 of potatoes, 48,196 tons of hay, 981,295 lbs. of butter, and 336,015 of cheese. There were 3 grist mills, 10 cotton and 18 woollen factories, 3 silk factories, 7 forges, 3 furnaces, 1 brass foundry, 2 manufacturing of machinery, 3 of agricultural implements, 18 paper mills, 10 tanneries, 3 newspaper offices, and 76 churches. The county is traversed by the Amherst and Belchertown, New Haven and Northampton, and Connecticut river railroads. It was organized in 1662, and dismembered by the separation of Franklin co. in 1811, and of Hampden co. in 1812. Named from Hampshire, England. Capital, Northampton. II. A N. co. of Va., bordering on Maryland, drained by Cacapon river and by the N. and S. branches of the Potomac; area, 850 sq. m.; pop. in 1850, 14,086, of whom 1,488 were slaves. It is traversed by ranges of the Alleghany chain, has numerous fertile valleys, and abounds in coal and iron. The productions in 1850 were 177,848 bushels of wheat, 292,252 of Indian corn, 84,118 of oats, 8,996 tons of hay, and 248,487 lbs. of butter. There were 9 grist mills, 4 woollen factories, 1 iron furnace, 11 tanneries, 2 newspaper offices, 38 churches, and 1,500 pupils attending public schools. Value of real estate in 1856, \$3,863,845, showing an increase since 1850 of 30 per cent. The Baltimore and Ohio railroad passes along the N. boundary. Capital, Romney.

**HAMPSHIRE**, HANTS, or **SOUTHAMPTON**, a maritime county of England, bounded N. by Berkshire, E. by Surrey and Sussex, S. by the English channel, and W. by Dorsetshire and Wiltshire; greatest length about 46 m., greatest breadth 41 m.; area, including the isle of Wight, 1,672 sq. m.; pop. in 1851, 402,083. This is one of the most agreeable counties in England, the surface being a beautiful alternation of hill and dale, and the climate remarkably mild and healthful. The soil is of various quality. The N. districts are hilly and poor; the S. W. portion is chiefly occupied by the New forest and extensive heaths; but in the central sections the land is fertile, and produces heavy crops of hay and corn. The principal vegetable productions are wheat, barley, oats, beans, turnips, and peas. Sheep are raised on the light lands, and the breeding and fattening of pigs is an important part of the husbandry. Ringwood is celebrated for its strong beer, and the paper mills of Romsey and Overton have supplied the bank of England with note paper since the reign of George I. The principal rivers are the Itchen, Avon, Stour, Tees, and Anton. There are two canals, the Basingstoke and the Andover. The most important towns are Portsmouth, Southampton, and Winchester. Aldershot, on the borders of Surrey, has recently become a place of some note from the forma-

tion of a military station on the adjoining heath. Four members are returned to parliament by the county, one by the isle of Wight, and 12 by 7 of the principal towns.

**HAMPTON**, a parish of Middlesex, England, 12 m. W. S. W. from London, on the N. bank of the Thames, near its junction with the Mole; pop. in 1851, 4,711. In the vicinity is the palace of Hampton Court, once a favorite residence of the Tudors and the Stuarts. It consists of 8 quadrangles, 2 of which were erected by Cardinal Wolsey, its original founder, who presented the palace when finished to Henry VIII., and the 8d by Sir Christopher Wren for William III. The western quadrangle has been little altered since Wolsey's time, and is an excellent specimen of Tudor architecture, but the other parts are not of much architectural interest. This palace contains a fine collection of pictures, including portraits of celebrated persons by the old English masters, and the famous cartoons of Raphael. Hampton Court is now open to the public free of charge, and is occupied in part by persons of rank in reduced circumstances. Wolsey's apartments have been restored. Edward VI. was born here.

**HAMPTON**, WADZ, an American general, born in South Carolina in 1755, died in Columbia, S. C., Feb. 4, 1835. During the revolutionary war he served under Sumter and Marion. He was a representative in congress from South Carolina from 1795 to 1797, and again from 1808 to 1805. In 1808 he was appointed by President Jefferson colonel of one of the 7 regiments then added to the U. S. army in apprehension of hostilities with Great Britain. In Feb. 1809, he was promoted to be a brigadier-general, and was subsequently stationed in command at New Orleans, where he was almost constantly involved in quarrels with his subordinate officers, and was in consequence superseded in 1812 by Gen. Wilkinson. In 1813 he was raised to the rank of major-general and appointed to the command of the force stationed at Norfolk, whence he was shortly afterward ordered to the northern frontier and placed in command of the army on Lake Champlain, with directions to threaten Montreal for the purpose of distracting the attention of the British from the attack on Kingston. The enemy, however, had at that time a naval superiority on the lake, and landed at Swanton and Plattsburg, burned the barracks and public stores at these places, and threatened a descent on Burlington. On Oct. 26 he made an attack on a much inferior British force commanded by Gen. Prevost, and was repulsed with some loss, though, as he stated in his despatch, he retired "in good order and unpursued." The attack on Montreal, for which 12,000 men had been concentrated near Lake Champlain, while the garrison of the city did not exceed 600, was frustrated by Hampton's unwillingness to co-operate with his colleague Gen. Wilkinson, with whom he had been long at enmity; and in November Hampton led his force into winter quarters at Plattsburg, and, giving up the com-

mand to Gen. Izard, returned to South Carolina. He resigned his commission April 6, 1814, and passed the rest of his life in agricultural pursuits, which he carried on with great success and on a very extensive scale. He was considered the wealthiest planter or farmer in the United States, and had acquired a large fortune by successful land speculations. From one plantation in Louisiana he is said to have raised in one year a crop worth \$150,000. He was reputed to be the owner of 8,000 slaves.

**HAMPTON ROADS**, an arm of Chesapeake bay, at the mouth of James river, between Hampton and Norfolk, Va., having a depth varying from 5 to 7 fathoms. It is commanded by Forts Monroe and Calhoun, which occupy opposite sides of its channel. Light-houses have been erected at various points to assist vessels entering this roadstead; and a light-ship is stationed off Willoughby's bank, with a bell which is rung in foggy weather.

**HAMSTER**, a rodent of the rat family, or *murida*, and the genus *crictus* (Ouv.). The incisors are  $\frac{3}{4}$ , and the cheek teeth  $\frac{3}{4}$ , or 16 in all, as in the rats; there are internal cheek pouches, as in certain monkeys, in which they carry grain and seeds to their subterranean abodes; the head is thick, the ears oval and round, the body rat-like, the legs short, and the tail about  $1\frac{1}{2}$  inches long, covered with hair. There are several species in Europe and northern Asia, of which the best known is the common hamster (*C. vulgaris*, Ouv.); it is a little larger than a rat, reddish gray above, black underneath, with 3 yellowish white spots on each side, a white spot on the throat, and another under the chest; legs whitish. It is sometimes almost entirely black. The grooves and tubercles of the molars are more regular than in the rat; the fore feet are 4-toed with the rudiment of a thumb, and the hind feet 5-toed, free, and furnished with long claws adapted to digging; the eyes are small but prominent; the fur fine and long. The hamster commits great havoc among the grain, by the large quantities which it carries to its burrows; these are dug 3 or 4 feet deep in light sandy soil, having 2 or more entrances and apartments, and each animal occupies his own; it thus lays up a store for winter, a part of which it passes in a state of lethargy; though its food is principally vegetable, it will devour flesh. It is ferocious and untamable, fighting with its mates, and biting the hand that feeds it. The burrows are often very complicated, and so capacious and well filled that it is an object with the farmer to collect their contents. Gestation lasts about 4 weeks, and occurs 3 or 4 times a year, each litter varying from 6 to 12. It is extremely cleanly in its habits, almost always, when awake, smoothing its fur with the paws, like a cat; it is an excellent climber, but a poor walker and runner; it is generally inactive during the day, in captivity at least. Other species are found in Siberia.—The Canada hamster, and others so called, with external cheek pouches, have been

described under *GOPHER*; the genus *crictus* is not found in America. An American mouse of the genus *hesperomys* (*H. myoides*, Gapper), resembling the white-footed species, is sometimes called hamster mouse from its having internal cheek pouches; in no other character does it approach *crictus*; it is found in Canada, Vermont, and New York.

**HANAU**, a German province and town, in the electorate of Hesse-Cassel; pop. of the former in 1855, 124,328, and of the latter about 17,000. The town is situated at the junction of the Kinzig with the Main, 10 m. by rail from Frankfort-on-the-Main. It contains an ancient castle, now the seat of the Wetteravian society of natural history. There are manufactories of silks, cottons, carpets, leather, &c. In the vicinity are the mineral springs of Wilhelmsbad. On Oct. 30, 1813, Napoleon, in his retreat from Leipsic, totally defeated here a superior force of Germans under Marshal Wrede.

**HANCOCK**, the name of 11 counties in the United States. I. A S. E. co. of Me., bordering on the Atlantic, and bounded W. in part by Penobscot river and bay; area, 2,000 sq. m.; pop. in 1850, 84,372. It is watered by Union river and several mill streams. The surface is uneven, and diversified with hills and lakes; the sea coast, including a number of islands, is 50 m. in extent and broken by many good harbors; the soil is fertile. The productions in 1850 were 24,749 bushels of Indian corn, 47,917 of oats, 75,168 of potatoes, 64,968 lbs. of wool, and 445,479 of butter. There were 41 grist mills, 47 saw mills, 1 woollen factory, 12 tanneries, 12 ship yards, 52 churches, and 12,258 pupils attending public schools. Many of the inhabitants are engaged in cod and mackerel fisheries, and lumber is largely exported. A railroad from Bangor to Calais, which will cross this county, has been projected. Capital, Ellsworth. II. An extreme N. W. co. of Va., bordering on Penn., and separated from Ohio on the N. and W. by the Ohio river; area, about 100 sq. m.; pop. in 1850, 4,050, of whom 3 were slaves. It has a hilly surface, a fertile soil, and contains coal and fire clay. The productions in 1850 were 52,418 bushels of wheat, 52,892 of Indian corn, 52,444 of oats, 63,666 lbs. of wool, and 75,966 of butter. There were 8 grist mills, 2 saw mills, 1 woollen factory, 12 brick yards, 8 churches, and 860 pupils attending public schools. Value of real estate in 1856, \$873,629, showing an increase since 1850 of 12 per cent. Formed from Brooke co. in 1848. Capital, New Cumberland. III. A central co. of Ga., bounded W. by the Oconee river, and E. by the N. fork of the Ogeechee; area, 440 sq. m.; pop. in 1852, 12,144, of whom 7,808 were slaves. The surface and soil are both diversified. The county is well timbered, and contains granite, gold, agate, chaledony, opal, kaolin, galena, zircon, and other minerals. The productions in 1850 were 11,874 bales of cotton, 440,699 bushels of Indian corn, 72,875 of oats, and 119,205 of sweet potatoes. There were 7 grist mills, 8



saw mills, 2 cotton factories, 21 churches, and 389 pupils attending public schools. Value of real estate in 1856, \$1,480,272. Formed in 1798. Capital, Sparta. IV. A N. W. co. of Ala., drained by Sipsey river and numerous other streams, and traversed by mountains of the Appalachian system; area, 600 sq. m.; pop. in 1850, 1,542, of whom 62 were slaves. Timber is abundant, and there are many fertile valleys. The productions in 1850 were 39,624 bushels of Indian corn, 7,866 of sweet potatoes, and 26 bales of cotton. There were 74 pupils attending public schools. Capital, Warren. V. An extreme S. co. of Miss., bounded S. by Lake Borgne, and W. by Pearl river, which separates it from Louisiana; area, about 1,000 sq. m.; pop. in 1850, 8,672, of whom 1,216 were slaves. The surface is hilly in the N. and nearly level in the S.; the soil is moderately fertile. The productions in 1850 were 22,825 bushels of Indian corn, 33,925 of sweet potatoes, 129,420 lbs. of rice, and 70 bales of cotton. There were 9 grist mills, 6 saw mills, 1 newspaper office, 5 churches, and 197 pupils attending public schools. Capital, Shieldsborough. VI. A N. E. co. of Tenn., bordering on Va., and drained by Clinch river; area, 480 sq. m.; pop. in 1850, 5,660, of whom 202 were slaves. It is mountainous, well timbered, and thought to be rich in iron ore. The productions in 1850 were 280,070 bushels of Indian corn, 49,310 of oats, 74,319 lbs. of butter, and 11,832 of wool. There were 3 grist mills, 7 saw mills, 8 tanneries, 12 churches, and 1,462 pupils attending public schools. Formed from Claiborne and Hawkins cos. about 1848. Capital, Sneedsville. VII. A N. W. co. of Ky., separated from Ind. by the Ohio river; area, about 500 sq. m.; pop. in 1850, 8,853, of whom 622 were slaves. It has a hilly and undulating surface, the uplands being generally fertile and the river bottoms extremely rich. The productions in 1850 were 210,780 bushels of Indian corn, 18,127 of oats, 398,843 lbs. of tobacco, and 20,172 of flax. There were 8 grist mills, 8 saw mills, 10 churches, and 275 pupils attending public schools. Value of real estate in 1855, \$778,261. Capital, Hawesville. VIII. A N. W. co. of Ohio, drained by branches of Auglaize and Portage rivers; area, 586 sq. m.; pop. in 1850, 16,751. It has a level surface and a rich soil, and abounds in limestone. The productions in 1850 were 451,391 bushels of Indian corn, 197,003 of wheat, 96,259 of oats, 10,728 tons of hay, and 53,404 lbs. of wool. There were 7 grist mills, 16 saw mills, 2 iron foundries, 5 woollen factories, 8 newspaper offices, 25 churches, and 5,873 pupils attending public schools. A branch of the Mad river and Lake Erie railroad terminates at Findlay, the capital. IX. A central co. of Ind., drained by Blue river and smaller streams; area, 312 sq. m.; pop. in 1850, 9,698. The surface is nearly level, and the soil is fertile. The productions in 1850 were 664,715 bushels of Indian corn, 58,267 of wheat, 49,864 of oats, and 8,821 tons of hay. There were 10 grist mills, 12 saw mills, 1 newspaper

office, 18 churches, and 650 pupils attending public schools. Timber is abundant, and horses and cattle are reared for exportation. The central railroad crosses the county. Organized in 1828. Capital, Greenfield. X. A W. co. of Ill., bordering on Mo. and Iowa, from which it is separated by the Mississippi river; area, 720 sq. m.; pop. in 1855, 22,158. It has an undulating surface, with alternate tracts of timber land and prairie, and a rich, well tilled soil. The productions in 1850 were 689,110 bushels of Indian corn, 189,436 of wheat, 137,947 of oats, 6,076 tons of hay, and 184,652 lbs. of butter. There were 10 grist mills, 9 saw mills, 2 newspaper offices, 18 churches, and 2,680 pupils attending public schools. Coal and limestone are abundant. Capital, Carthage. XI. A N. co. of Iowa, drained by Boone river, which rises in Boone lake in the N. part of the co.; area, 500 sq. m. It has been recently formed, and is not included in the state census of 1856.

HANCOCK, JOHN, an American statesman, born in Quincy, Mass., Jan. 12, 1737, died there, Oct. 8, 1798. He was graduated at Harvard college in 1754, and shortly after entered the counting-house of an uncle, on whose death in 1764 he received a large fortune, and soon became a prominent merchant. In 1766 he was chosen to the Massachusetts house of representatives from Boston, as associate with Otis, Cushing, and Samuel Adams. It was the seizure of his sloop, the Liberty, that occasioned the riot in 1768, when the royal commissioners of customs narrowly escaped with their lives. After the affray known as the "Boston massacre," in 1770, he was a member of the committee to demand of the royal governor the removal of the troops from the city; and at the funeral of the slain he delivered an address so glowing and fearless in its reprobation of the conduct of the soldiery and their leaders, as greatly to offend the governor, who now endeavored to seize the persons of Hancock and Samuel Adams, both of whom were members of the provincial congress at Concord, of which the former was chosen president in 1774. This is said to have been one of the objects of the expedition to Concord which led to the first battle of the revolution, after which Gov. Gage offered pardon to all the rebels except these two, "whose offences," he adds, "are of too flagitious a nature to admit of any other consideration but that of condign punishment." In 1775 Mr. Hancock was chosen president of the continental congress, and in 1776 signed the declaration of independence. Leaving congress in 1777, on account of ill health, he returned to Massachusetts, where he was a member of the convention for forming a constitution for the state, and under that constitution was in 1780 chosen first governor; to which office, with an interval of two years, he was annually reelected till his death. Mr. Hancock was a man of strong common sense and great decision of character, of polished manners, easy address, affable, liberal, and charitable. In his public speeches he acquitted himself with

high degree of popular eloquence. As a preiding officer he was dignified, impartial, quick of apprehension, and always commanded the respect of congress. He employed his large fortune for useful and benevolent purposes, and was a liberal donor to Harvard college.

HANDEL, or HÄNDEL, GEORG FRIEDRICH, a German composer, born in Halle, Prussian Saxony, Feb. 23, 1685, died in London, April 18, 1759. Valentine Händel, or Hendel, a young coppersmith of Breslau in Silesia, where the name is still common, emigrated, and in 1609 became a citizen of Halle, where he died in 1686. His two eldest sons followed the trade of their father; his youngest, Georg, born in 1622, was apprenticed to a vocation—surgeon-barber—of which one branch stood lower, the other higher, than in our time. In Feb. 1643, Georg Händel married the widow of Nicholas Oettinger, the surgeon-barber of Halle, a woman 10 years older than himself, and through this marriage reached the honor of being inscribed "master" and citizen of Halle. At the age of 80 he was made official surgeon of the circle of Giebichenstein, including Halle, and within 20 years after had reached the position of privy chamberlain and body surgeon to a Saxon prince then residing in the city, and to the elector of Brandenburg—facts not unimportant as showing the social position into which the composer was born. Master Händel lost his wife Oct. 9, 1682, who had borne him 3 sons and as many daughters, one of each only living to marry and keep up the family. On April 23, 1683, he married Dorothea Taust, daughter of the pastor of Giebichenstein, a village under an ancient castle, on the Saale, an English mile north of Halle. The children of Master Händel by Dorothea were the composer and two daughters. The father was ambitious that this son of his age—he was 62 when the child was born—should rise still higher in the social scale than he had done, and, having abundant means, determined to educate him for the law. Nature decided for music, and indeed so strongly that in early childhood the father thought it necessary to lay his interdict upon the study of the art. In his necessity the boy was fain to practise organ music by night upon one of the small clavi-chords of that period. About 1693-'4, the father was called to Weissenfels by the duke upon business. The child prayed to be taken thither; but, being persistently refused, he left the house unnoticed, and, at too great a distance from the city to be sent back alone and on foot, or for the father to turn back with him, suddenly appeared at the side of the vehicle, and was of necessity allowed to make the journey. A grandson of the old gentleman held at the time some post in the family of the duke, by whom the talents of his young uncle were made known to the members of the musical chapel. Upon a Sunday the boy was taken into the organ loft, and at the close of the service was placed in the organist's seat to play the voluntary. The duke remained to hear him play, and afterward

asked Georg Christian who the child was. "Little Händel from Halle, my grandfather's youngest son," was the odd reply. The duke's views of music and musicians, and his arguments in their favor, were such as so far to abate the father's prejudices that on returning to Halle music was added to the other studies of the child. The teacher chosen was Friedrich Wilhelm Zachau, the first organist and instructor in Halle, a thorough master of the old Saxon school, of which Heinrich Schütz, Bach, and Handel stand in history as the brightest ornaments. It may, we think, be considered as fortunate, that while the pupil found in Zachau a zealous, thorough, and skilful instructor, he was not overshadowed and the natural bent of his genius cramped by his master's greatness as a composer. While pursuing the usual school studies then required of boys intended for the gymnasium and the university, he was kept by Zachau upon contrapuntal and fugal exercises, to steady practice upon the organ and harpsichord, and gradually brought to a familiar practical knowledge of the then principal instruments of the orchestra, the string quartet, the flute, and oboe. To develop his feeling for musical form, he copied specimens of the style of the principal masters of his time, particularly of the old organists. When in the height of his fame in England a manuscript containing 6 sonatas for 2 oboes and base, which Lord Polwarth had found in Germany and presented to the great flute virtuoso, Weidemann, was shown to Handel. He looked over these productions of his childhood with evident pleasure, and at length said, laughing: "In those days I composed like the devil, and especially for the oboe, which was my favorite instrument." At least as early as 1696, when 11 years of age, a friend of the father took the child to Berlin and presented him to the elector, afterward Frederic I. of Prussia, who was so much struck by his talents as to offer to take charge of his education and send him to Italy—a favor, however, wisely declined by Master Georg Händel. During his stay in Berlin the young musician had opportunity of hearing other and far higher music than before, the brothers Bononcini and the composer Attilio being in Frederic's service, and music being in a highly flourishing condition, through the influence of the electress, herself a fine musician. Young Handel returned to Halle, to school, and to Zachau, and was afterward bound to home by new and stronger ties; for on Feb. 11, 1697, his father died, and the mother could not part with her only son. No immediate change in the plans laid for the son by the deceased father was made. The boy pursued his studies with such zeal and success as to matriculate in the young university of his native city, Feb. 10, 1702. He was already an extraordinary performer upon the harpsichord and organ, a good violinist, and familiar with the instruments then in use. Ten years of constant practice had brought him to that skill in composition by which his musical ideas were thrown upon paper

with as much facility as he wrote his native German; but as yet he was not emancipated from the forms of the schools, and wrote a fugue with more ease and elegance than a melody. With him the scale hung in even balance between the law and music. The acquaintance and friendship between him and Telemann he held to have been the weight which turned the balance in favor of art. On March 13, 1702, Handel, having just completed his 17th year, was formally installed organist of the *Dom-Kirche* at Halle, with a regular salary and a right of free house rent, amounting in the aggregate to \$50 per annum. At the end of the first year he resigned. A new prospect had opened before him. Dorothea Handel had allowed her son with her blessing to abandon the law. In March, 1708, Handel made music his profession. There was nothing more for him to learn in Halle or Leipzig; but in Hanover the greatest of the Italians then in North Germany, Abbé Steffani, was chapelmaster; and in Hamburg, Reinhard Keiser, the greatest German operatic composer of his day, was astonishing the public by his inexhaustible fund of pleasing popular melody. To these cities the youth bent his steps. Hawkins records Handel's own account of his reception in Hanover: "When I first arrived at Hanover I was a young man under 20. I was acquainted with the merits of Steffani, and he had heard of me. I understood somewhat of music, and could play pretty well on the organ. He received me with great kindness, and took an early opportunity to introduce me to the princess Sophia and the elector's son, giving them to understand that I was what he was pleased to call a virtuoso in music; he obliged me with instructions for my conduct and behavior during my residence at Hanover; and being called from the city to attend to matters of a public concern, he left me in possession of that favor and patronage which himself had enjoyed for a series of years." We know that Steffani exerted a powerful influence both upon Handel's musical development and upon his future career, but the means of tracing this minutely have not yet been discovered. In June, 1708, Handel, doubtless by advice of Steffani, was in Hamburg. During the short opera season, ending in August, he played second violin in the orchestra, which with teaching seems to have been his only means of support; but this was already more than sufficient. He soon had an opportunity of showing his powers. The harpsichordist being one evening absent, the youthful violinist was persuaded to take the seat to the astonishment of all the orchestra. Handel's first work of importance in Hamburg was a sort of oratorio on the "Passion," which Chrysander dates with great probability during the spring of 1704; his second, the opera *Almira*, composed in the summer and autumn of the same year. On the evening of Dec. 5, Mattheson's *Cleopatra* was performed, the author, a tenor singer, taking the part of Antony. As composer he had the right to direct, and had at previous perform-

ances, after the death of the hero, come into the orchestra and taken the direction. On this evening Handel, being at the instrument, refused to give up his seat. On leaving the theatre officious friends excited the ill blood between them to such a degree that they drew their swords upon each other in the open market place. The contest ended by the springing of Mattheson's weapon upon a broad metal button of Handel's coat—a narrow escape for the composer. On Christmas day Keiser and others mediated between them, friendship was restored, Handel dined with Mattheson, and in the evening they attended together the rehearsal of *Almira*, which was produced Jan. 8, 1706. It ran 20 nights, until replaced by another work from the same pen, *Nerone*, Handel's second work for the stage. It was given but 3 or 8 times, owing to the interruption of Lent. Another work, with a most wretched text, completes the list of those which he wrote for the Hamburg stage; but it was not given until 1708, when the author had been long in Italy, and then owing to its length was divided into two, *Florindo* and *Dafne*. During the latter part of his residence in Hamburg Handel's time was fully occupied by his pupils and his studies. In 8 years he had saved 200 ducats which he could call his own. One invitation to visit Italy without expense in the train of a prince he had declined. The winter of 1706-7 he passed in Florence with a Tuscan nobleman who had known him and heard his *Almira* in Hamburg. A *Dixit Dominus* of his composition shows that he was in Rome in April, 1707. In the autumn he returned to Florence and composed *Rodrigo*, his first Italian opera, which was received with very great applause. In April, 1708, he was again in Rome, as the date upon his oratorio *Risurrezione* proves, which was followed by a cantata, *Il trionfo del tempo e del disinganno*. No opera being allowed at that time in Rome, his works there are confined to music in this department of the art and for the church. His refusal to change his religion alone prevented him from attaining the highest honors possible for the musical artist in Rome. In the summer of 1708 he was in Naples, where he composed the original Italian "Acis and Galatea," and other works of less importance. For the carnival in Venice in the spring of 1709 he composed the opera *Agrippina*, which was performed with extraordinary success. Being appointed chapelmaster by the elector of Hanover, afterward George I. of England, which office he accepted on condition of being allowed to visit London, he returned to Germany, spent a year there, and arrived in England near the close of 1710. He was not yet 25 years old, but famous as a virtuoso on the organ and harpsichord, and still more as the Rossini of his day in Italian opera, and all the fashionable world waited impatiently for a proof of his powers on the newly established stage. On Feb. 24, 1711, *Estro del* was given, which, according to Aaron Hill, was

composed in a fortnight, yet fully satisfied all expectations, and which was so much admired that Walsh gained £1,500 by publishing its songs and airs alone. The season closed June 2, and Handel returned to Hanover for a time, during which he composed most of his chamber duets, taking those of Steffani as his model. Probably also a large proportion of his instrumental music may be referred to this period, as little else was demanded from a Hanoverian chapelmaster. In the summer of 1713 he returned to England, where he produced, on Nov. 26 of that year, the short pastoral opera *Il pastor fido*; Jan. 10, 1713, *Teseo*; Feb. 6, "Ode on Queen Anne's Birthday;" and in the summer, the "Utrecht Te Deum," which he had completed in January preceding, and for which the queen settled upon him a pension of £200 per annum. This "Te Deum," which celebrated an event distasteful to the elector, together with Handel's prolonged stay in London, cost him for a time the favor of George. But Burlington house, with the artistic and literary society which a residence there offered, and the prospect of continued operatic triumphs, had too strong an attraction for Handel; and he braved the elector's displeasure. With the exception of *Silla*, a short opera, written evidently for private performance at Burlington house, he composed no extensive score until the *Amadige* in 1715. Meantime Anne had died, and the elector had been crowned king of England, at whose court Handel dared not appear. By advice of Baron Killmansegge and Lord Burlington, he prepared a set of instrumental pieces, employing all the instruments then in use, which were performed, Aug. 22, 1715, on occasion of a grand boat procession on the Thames in which the king took part. This music is the well known "Water Music," and its striking beauties restored the composer to royal favor. Another £200 was added to his salary, which was again increased by a like amount a few years later, when he undertook the musical instruction of the young princesses. In 1716 Handel went with the court to Hanover, and the only important work of this year was the music to Brookes's German poem on the "Passion of Christ." On returning to London and finding no opportunity for operatic composition, he accepted the place of music director to the duke of Chandos, for whose chapel during the next 8 years he composed the noble works, in 3, 4, and 5 parts, known as the "Chandos Anthems," and for whom were written his first English oratorio, "Esther," performed Aug. 29, 1720—a most important date both in the history of Handel and that of English music—and the English "Acis and Galatea." In Aug. 1718, a great domestic affliction befell him—the death of his only remaining sister, Mrs. Michaelson. A letter from him to the widower, his brother-in-law, dated Feb. 1719, explains his long delay in coming to Halle to comfort his mother in her sorrow, as caused by *affaires indispensables* (for he wrote in

French), upon which he dared to say his future career depended, but which had been most tediously spun out; but now he hoped in a month at least to see them. This business was an attempt to place Italian opera in London upon a firm foundation, under the name of the "Royal Academy of Music," by a subscription of £50,000 from the king and nobility. Handel was to be composer, assisted by the Bononcini and Attilio, whom he had known as a child in Berlin. He went to the continent, engaged a company of singers, and the royal academy opened April 2, 1720. The compositions of Handel for this undertaking were: *Radamisto*, first performed April 27, 1720; *Musio Scevola* (3d act only), April, 1721; *Floridante*, Dec. 9, 1721; *Ottone*, Jan. 12, 1723; *Flavio* and *Giulio Cesare*, 1723; *Tamerlano*, 1724; *Rodelinda*, 1725; *Scipione*, 1726; *Alessandro*, May 7, 1726; *Admeto*, 1727; *Siroe* (Cyrus), 1728; *Tolomeo*, 1728. Twelve operas and a transcendent third act of another, together with his labors as royal chapelmaster and director of the opera, would seem to be enough for the productiveness of 8 years; but Handel's powers were inexhaustible, and in 1727 he had added to the list of his minor works the noble anthems for the coronation of George II. But with the production of *Tolomeo* in 1728, the £50,000 subscription was exhausted, and the royal academy was bankrupt. Handel had now saved £10,000 from his various sources of income, and determined to risk it in the attempt to carry on an enterprise in which the nobility had signally failed. He therefore formed a partnership for 8 years with Heidegger of the Haymarket theatre, the "ugly Swiss count;" visited Germany, thence went on to Italy, taking his old friend and monitor Abbé Steffani with him, and returned to London with an excellent company in June, 1729. The season opened Dec. 2. For this enterprise Handel's operatic works were: *Lotario*, Dec. 2, 1729; *Partenope*, Feb. 24, 1730; *Porro*, Feb. 2, 1731; *Esio*, Jan. 25, 1732; *Sosarme*, Feb. 15, 1732; *Orlando*, Jan. 27, 1733; *Ariadne*, Jan. 26, 1734; *Parnasso in festa* (serenata partly new), March 13, 1734; *Pastor fido* (completely rearranged), June 4, 1734. In addition to his operatic labors, he during this time entered upon a path peculiarly his own. In consequence of certain semi-public performances of his oratorio "Esther," for the benefit of parties who had surreptitiously obtained a copy of the score, Handel, in Lent, 1732, "by his majesty's command," brought it upon the stage of the Haymarket (without action of course), having thoroughly revised it and made several additions. The king and all the royal family were present. It was given 5 times, and proved a powerful spur to Handel in that direction in which he stands above all other composers, and for which his dramatic experience was rapidly fitting him. The proprietors of the English opera, too, had recently brought out his "Acis and Galatea" with action, which led him to produce it also with large additions from his Italian se-

renata on the same subject, making of it a melody of both languages. The success of "Esther" induced him to try oratorio again, and he prepared "Deborah," which was given March 17, 1788. In July he conducted the performance of his third English oratorio, "Athaliah," at Oxford. During the same season the conduct of Senesino, his principal singer (who had been once caned by Lord Peterborough behind the scenes for insulting one of the female singers), was such that Handel discharged him; and as the composer refused to recall him, choosing to offend the nobility rather than tarnish his honor by sacrificing his independence, a coalition was formed against him, and a rival opera established, with Senesino, Farinelli, and Cuzzoni—perhaps the 8 greatest singers of the age, Farinelli of any age—as principal vocalists, and Porpora and Arrigoni as composers. Handel, undaunted by the combination against him, posted to Italy, engaged a good troupe, and opened the season of 1784 with 3 operas, the music of which was but arranged with new recitatives by him—*Semiramida*, *Cajo Fubrizio*, and *Arbace*. The season ended with the *Pastor fido*, and with it Handel's engagements with Heidegger. Oct. 5, 1784, he opened at Lincoln's Inn fields with revivals of *Ariadne* and *Pastor fido*, but soon removed to Covent Garden. The first work, mostly original, was *Terpsicore*, a sort of ballet interspersed with vocal music, followed by *Ariadne*, opera, Jan. 8, 1785. During Lent he gave his 8 oratorios with organ concertos between the acts, and was ready on April 16 with another opera, *Aleina*. In the autumn Caretini, his first singer, was called by previous engagements to Italy, and during the succeeding winter Handel was forced to depend upon performances of "Esther" and "Acis and Galatea," with one new work, his magnificent music to Dryden's "Alexander's Feast," the first performance of which is said to have brought a house of £450. But succeeding in engaging a new singer of high reputation, Conti, he returned again to opera, producing *Atalanta*, May 12, 1786; *Arminio*, Jan. 12, 1787; *Giustino*, Feb. 16, 1787; *Berenice*, May 18, 1787. Handel had tried every honorable means to achieve success. He had given old favorite operas revised, and new ones with extraordinary scenic effects; had prepared a *pasticcio* or two from the most popular music of his earlier works; had resorted to oratorio, and to the performance of concerts upon harpsichord and organ, wherein he was acknowledged by all to be absolutely without a rival. But London, which had not supported a single exotic opera, could not now, when the novelty was exhausted, encourage two; and with the failure of the *Berenice* his £10,000 were at an end, and his enemies had the satisfaction of having at length crushed him. But they too were exhausted. Handel closed his theatre in May; they followed in September. Farinelli had deserted them, refusing to sing to a house the receipts of which were but £35, and they closed their accounts with a loss of £12,000.

Before Handel finally gave way to the pressure against him, his health had failed, and soon after the catastrophe an attack of paralysis prostrated him. His friends with difficulty persuaded him to visit Aix la Chapelle; but once there, away from all his vexations and troubles, his constitution, for which the baths were peculiarly adapted, triumphed; in 6 weeks he was restored, and returned to London to face his creditors and engage in gigantic labors to discharge his debts. As a specimen of his activity we may mention that on Nov. 1 he was again in London; on the 15th he began the opera *Faramondo*, for the younger Heidegger; on the 20th Queen Caroline died, and the king ordered a funeral anthem, which was completed in 5 days—one of Handel's grandest and most touching works; he then took up the opera again, and on Dec. 24 it was completed. *Faramondo* was produced in Jan. 1788, but was unpopular; so unjustly so that the musical public caused it to be printed by subscription. On Feb. 25 *Alexander Severo* followed, arranged from his other works, and on April 15 *Seras* (Xerxes), a new work. The great public did not desert the composer in his trouble, although it refused to sustain the operative enterprise of Heidegger. At a concert given "for the benefit of Mr. Handel," March 28, the net receipts were £800. At this period he was engaged to compose music for Vauxhall gardens, and the popularity of his music—the Strauss music of that day—was such, that Tyers, the proprietor, erected to his honor in a conspicuous place a marble statue by Roubiliac, at a cost of over £800. Heidegger's ill-fated operative enterprise closed June 6, not to be renewed; and Handel gave his attention to other studies, preparing several of his organ concertos for publication, and composing the oratorios "Saul" and "Israel in Egypt," which were completed before the close of October. These two immense works were produced in the series of 18 oratorio performances of the succeeding winter and spring, the former Jan. 16, the latter April 4, 1789. For his 18 concerts in Lincoln's Inn fields during the season of 1789-'90 the new works were Dryden's "St. Cecilia Ode" (not the "Alexander's Feast"), and Milton's *L'Allegro* and *Il penseroso*. The season of 1740-'41 comprised 14 performances, the new works being *Ireneo* (Hymen) and *Deidamia*, Italian operas which did not succeed. This closed his attempts to produce opera. The public would support neither him nor any other person at that time in giving opera in a foreign language, as Lord Middlesex learned to his cost the next winter. Discouraged at length, he determined to accept a long standing and pressing invitation from the lord lieutenant and other notables of Ireland and visit Dublin. For performance there he composed a new work to a text selected from the Bible by his friend Charles Jennings, Esq. This was the "Sacred Oratorio," now known as the "Messiah." He reached Dublin Nov. 18, 1741, and began his first series of 6 concerts, Dec. 23. A sacred or-

ries of 6 began Feb. 6, 1742, after which 4 supplemental performances were given, the 2d and 4th of which, April 18 and June 8, were the first public productions of the immortal "Messiah." The greatness of the work was immediately appreciated, and its author enjoyed once more the pleasure of a triumphant success. After a stay of 9 months in Ireland, Handel returned to London crowned with success and honor, and filled with gratitude and affection for the polite circles of Dublin. He seems now to have indulged for a time in a period of rest and inactivity; but in the spring of 1748 he gave a series of 12 oratorio performances (the "Messiah" occupying 3, and a new work, "Samson," 8), with great success, if one may believe an eyewitness who says: "More persons were turned away from Handel's doors than were present at Lord Middlessex's Italian opera." For his season of 1744 the new works were the "Dettingen Te Deum," "Semele," and "Joseph and his Brethren;" for that of 1744-'5, for which he had taken the Haymarket theatre, "Hercules," "Belshazzar," and a revival of "Deborah." But the faction of the nobility—especially a set of titled women, who placed Senesino higher than Handel—not yet satisfied with the injuries inflicted upon the composer, succeeded so far in curtailing the list of his subscribers as to render him unable to meet the great expenses he had incurred in producing his works upon the large stage of the Haymarket, and on a scale of then unknown grandeur; and in the spring of 1745, after the 16th of the 24 performances advertised, he was forced to close his doors and again suspend payment. During the spring of 1746 he gave only the 8 performances which were due to the subscribers of the year before, with but one new work, the "Occasional Oratorio," which, so far from being a *pasticcio*, as is often represented, contains in 87 pieces but 6 from older works. From this time onward Handel abandoned the plan of depending upon the subscriptions of the higher classes, throwing himself upon the generosity and musical taste of the general public; nor was he deceived. During the remainder of his life he gave every spring a series of 10 to 18 concerts, and with such success that he paid his debts to the uttermost farthing, and in little more than 10 years accumulated £20,000. The new works of these latter years were: "Judas Maccabæus," 1747, which he gave 6 times; "Alexander," 1748; "Joshua," 1748; "Susannah," 1749; "Solomon," 1749; "Theodora," 1750; "Choice of Hercules," 1751; "Jephthah," 1752, the last of this stupendous series of dramatic oratorios. While at work on "Jephthah," which he began Jan. 15, 1751, and ended Aug. 30, his sight began to fail. Three operations were performed upon his eyes without success, and when the work was produced the next year, the grand old man was led into the orchestra blind. Thenceforward his pupil, John Christian Smith, aided him in conducting his oratorios, and

acted as his amanuensis in the additions and changes which he still occasionally made in them. This was the case with the translation, with much added matter, of the *Il trionfo del tempo e del disinganno* of his youth, into the fine work, "The Triumph of Time and Truth." During the winter of 1758-'9 his health failed again; but although he felt himself rapidly drawing near the close of his life of intense activity, he opened his usual series of oratorios, March 2, with "Solomon," with "new additions and alterations." "Susannah," also with new additions and alterations, followed. "Samson" was given on the 14th, 16th, and 21st of the same month, and "Judas Maccabæus" on the 28d and 29th; on March 30 and April 4 and 6, the "Messiah." The performance on the 6th was the last at which the composer was present. On reaching his house in Brook street he went to bed quite exhausted, and never rose from it. On the 17th anniversary of his first performance of the "Messiah," a little before midnight, he breathed his last, 7 weeks after completing his 74th year. He was buried in Westminster abbey, and his statue is conspicuous among the monuments of the venerable "poets' corner" of that edifice.—During the lifetime of the composer the poet Pope called him the "giant Handel," an epithet the justice of which to this day every musician feels. His greatness was fully acknowledged by his contemporary Bach, and by the greatest that have followed them in the musical profession. Beethoven did not hesitate to call him the greatest composer that ever lived. Handel possessed an inexhaustible fund of melody, of the richest and noblest character; an almost unparalleled power of musical expression; an unlimited command of all the resources of contrapuntal and fugal science; a power of wielding huge masses of tone with the most perfect ease and felicity. But perhaps his leading characteristic was the grandeur, majesty, and sublimity of his conceptions. He carried the old forms of opera to their highest perfection; infused a new life and power into English ecclesiastical music; was as an instrumental composer equalled by none but Bach, and in one direction surpassed all others who have written. We refer to the dramatic oratorio, of which, if not the creator, he was the perfecter, and reached a height in the "Messiah," "Israel in Egypt," "Samson," and "Judas Maccabæus," whereon he stands alone. The problem he undertook to solve was that of giving such dramatic force and expression to the music in which he clothed his sacred texts, as to be able to dispense with all scenic and stage effects, and this he did with marvellous success. Making all due allowance for the thinness of his scores in comparison with those written for the modern orchestra, and for his occasional adaptations from other works, still the rapidity with which he produced his greatest compositions has hardly a parallel in musical history: "Atalanta" in 19 days; "Rinaldo" in a fortnight; "Alexander's Feast" in 17 days; con-

certante for 9 instruments in one day; the "Messiah" in 23 days; and "Samson," begun only 11 days after, in 35.—Victor Schoelcher's elaborate biography of Handel appeared in London in 1857, and the 1st volume of a new work on him by Ohryander in Leipzig in 1858. Mrs. Bray's "Handel, his Life, Personal and Professional," was published in London shortly after the great Handel festival at the crystal palace in June, 1857. The centennial anniversary of his death was celebrated in London on a gigantic scale in 1859.

**HANG-CHOW-FOO**, a city of China, capital of the province of Che-Kiang, 2 m. from the river Tsien-tang-kiang, and 40 m. from its mouth in the bay of Hang-chow, at the S. terminus of the imperial canal; lat. 30° 21' N., long. 120° 8' E.; pop. estimated at 700,000. It is of an oblong form, well built, and surrounded with a high wall about 8 m. in circuit. In the city are several arches, monuments, and splendid Buddhist temples. It has a large citadel and a garrison consisting of 7,000 troops. The houses are generally one story high and surrounded with gardens. The streets are narrow but paved, and kept tolerably clean, and the shops are large and well stocked. The city has an active trade, and is famous for its manufactures of silks, and particularly taffetas and satins, which are very fashionable, and perhaps more sought for than those of any other city of the province; 60,000 people are engaged in these manufactures alone. The river opposite the city is 4 m. broad at high water, and is remarkable for the rapidity of its flow, the spring night tides rising 30 feet and with a velocity of 7½ knots. Hang-chow-foo is the celebrated Kinsai of Marco Polo, the capital in his time of southern China.

**HANKA**, WENCESLAW, a Bohemian philologist and critic, born in Horeniovce, June 10, 1791. He distinguished himself in 1817 by the discovery of the "Manuscript of Königinhof" (*Dukopis Kralodvorsky*), a collection of beautiful lyric and epic Czech poems, written about the beginning of the 14th century; and in 1823 he became librarian of the national museum at Prague. He has written a number of grammatical, lexicographical, and critical works on Slavic languages and literature, publishing beside various translations from foreign languages and editions of ancient Czech literary productions.

**HANKE**, HENRIETTE WILHELMINE, the most fertile female novelist of Germany, born in Jauer, Prussian Silesia, June 24, 1785. The daughter of a merchant named Arndt, she married in 1814 the Rev. Mr. Hanke, and after the death of her husband (1819) devoted herself to literary pursuits. Her collected works (Hanover, 1841-'56) comprise no fewer than 120 vols., including many novels of a didactic character.

**HANNAY**, JAMES, an English journalist and novelist, born in Dumfries, Scotland, Feb. 17, 1827. At the age of 13 he entered the navy, but left it after 5 years' service. The work by which he is best known is the novel of "Single-

ton Fontenoy" (1850), which contains much acute delineation of character. Among his other writings are "Biscuit and Grog" (1848); "Claret Cup" (1848); "Hearts are Trumps" (1848); "King Dobbs" (1849); "Sands and Shells" (1854); and 6 lectures on "Satire and Satirists." In 1857 he was an unsuccessful candidate for the representation in parliament of his native borough.

**HANNIBAL**, a city of Marion co., Mo., on the W. bank of the Mississippi river, 133 m. above St. Louis, and 108 m. N. N. E. from Jefferson City; pop. in 1850, 2,020; in 1859, about 4,500. It is the E. terminus of the Hannibal and St. Joseph railroad, has steamboat communication with Quincy, Ill., 15 m. further up the river, and with St. Louis, and in course of 1859 will have a railroad connection with Quincy. It is favorably situated for commerce, is rapidly increasing, and is the shipping place for large quantities of hemp, tobacco, pork, and other produce of the surrounding country. Coal and carboniferous limestone abound in the neighborhood. Hannibal contains a city hall, a market house, several large tobacco factories, hemp presses, pork packing establishments, flour mills, saw mills, foundries, and machine shops, and in 1860 contained 11 churches (Baptist, Christian, Cumberland Presbyterian, Dutch Reformed, Episcopal, 2 Methodist, 2 Presbyterian, Roman Catholic, and Unitarian), and 5 newspapers.

**HANNIBAL**, or **ANNIBAL** (in Punic, probably, "favorite of Baal"), a Carthaginian general and statesman, born in 247 B. C., died in Nicomedia, Bithynia, in 183. He was the son of Hamilcar Barca, the Carthaginian hero of the first Punic war and leader of the popular party in his state; and the first years of his life were spent amid the impressions caused by the achievements of his father, the disasters which terminated that protracted struggle against Rome, and the horrors of the military mutiny which followed it. Having quelled this mutiny, and prepared for the conquest of Spain, which was to compensate Carthage for the loss of Sicily and Sardinia, Hamilcar, designing to take with him his son, then a boy of 9 years, led him before their departure to an altar, and made him swear eternal enmity to the Romans. Spain, which Hamilcar and his son-in-law and successor in command Hasdrubal conquered as far as the Ebro, at the same time developing its mining and other resources, was an excellent school for the future avenger of his country; and when he took the command himself, on the death of his brother-in-law (221 B. C.), he possessed all the qualities which could promise success to the great military and political schemes of the house of Barca. He united the boldness of youth with the self-possession of old age, the vigor of a soldier with the experience of a general, oriental passion with Greek culture, taciturnity with eloquence, shrewdness with genius; he was patient and temperate to the extreme, a model of chastity, and able alike to conquer by the sword, by stratagem, and by

error. His first task, when at the head of the great army of Spain, was to complete the conquest of the country S. of the Ebro by the reduction of various tribes and places still hostile to the Carthaginian rule. After a few victories, Saguntum (now Murviedro in Valencia) alone remained to be subdued. This city, a Greek colony, was an ally of Rome; but this was only another inducement for Hannibal to attack it, and at the head of 150,000 men he was strong enough to undertake the siege against the will of his government and the wish of the predominant party in Carthage. Saguntum, after a defence of 8 months, characterized by that desperate valor which has marked the struggles of so many cities in ancient as well as modern Spain, fell while Rome was still deliberating on its rescue (219). Hannibal stained his victory by cruelty, but the rich booty sent to Carthage silenced the accusations of his enemies and augmented the number of the friends of war. Rome demanded in vain the surrender of the young general, and at last through her envoy, Quintus Fabius Maximus, declared war. Thus the second Punic war was begun. Unlike the first, which was waged chiefly for the possession of the islands of the Mediterranean, the genius of Hannibal made it a struggle for the destruction of Rome, which he hoped to achieve by an invasion of Italy from the north, and with the assistance of the half subdued subjects of the tyrannical republic, of whom the Insubrian and Boian Gauls had secretly promised a speedy revolt. Having secured the coasts of Africa by an army of Spaniards, and Spain by another of Africans under his brother Hasdrubal, he started from New Carthage in the spring of 218, with 90,000 foot, 12,000 horse, and 37 elephants, crossed the Ebro, subdued in a series of bloody struggles the warlike tribes of north-eastern Spain, and passed the Pyrénées, leaving Hanno to guard the passes, and dismissing thousands of native Spanish troops to show his confidence of success. His army was now reduced to 59,000 men, with whom he speedily traversed the country between the Pyrénées and the Rhone, crossed that river, unchecked by the hostile Massiliotes, old allies of Rome, and their warlike Gallic neighbors, and, avoiding the cavalry of P. Cornelius Scipio the elder, who had landed on the coast of Gaul, marched up the Rhone and Isère, and through the comparatively level peninsula of the Allobroges between those two rivers to the Alps. It is now generally believed that he crossed the Graian range and the Little St. Bernard, which agrees with the relation of Polybius, although some still hold that his route was across the Cottian range and Mt. Cenis (as Livy relates), or Mt. Genèvre. The stormy autumn weather and the treachery of the Centrones, a Gallic tribe, greatly augmented the natural horrors of this 15 days' passage of an army consisting in part of horsemen and elephants along narrow paths, between precipices and avalanches, over rocky peaks and ice fields lightly covered with snow.

But the spirit of the general proved equally ingenious in baffling the unexpected assaults of the Gauls, and in contriving artificial means for transporting the army with its trains. Of this, however, no more than 20,000 foot and 6,000 horse could be mustered in the valleys of the Dora Baltea. But the Insubrians and Boians had kept their promise and risen against the Romans; they now readily joined his banners. Having captured Taurinium (Turin), which was hostile to the Insubrians, he defeated Scipio, who had returned with a part of his army from Gaul to meet him on his descent from the Alps, in a cavalry engagement on the Ticino. It was his first battle against Romans, and the first in Italy; and knowing the importance of the first impression, he had inspired his brave Numidian cavalry by a fiery speech. The consul retreated toward the fortified town of Placentia (Piacenza), but could not prevent his colleague T. Sempronius, after his arrival from Sicily, from accepting a battle on the Trebia, in which the Romans were entrapped into an ambuscade by Mago, the younger brother of Hannibal, and completely routed. Only a part of their army escaped toward the fortresses of the Po. The campaign of the year 218 had thus been a succession of triumphs for Hannibal from the Ebro to the Trebia. The Romans now armed to defend the lines of the Apennines, sending the new consuls of the year 217, Servilius and Flaminius, to Umbria and Etruria, on either of which an attack was expected. Hannibal chose a western passage over the mountains, where he lost all his remaining elephants but one, and having crossed the marshy environs of the Arno, during which perilous march he lost his right eye, he passed by the camp of Flaminius at Arretium (Arezzo), and finally enticed him from his position into a defile between Cortona and Lake Trasymenus (now the lake of Perugia), where the Romans were suddenly attacked by the Carthaginians in front and rear. Half of the Roman army perished by the sword or in the lake, and the other half was captured, and the consul fell. Four thousand horsemen, the vanguard of Servilius, who was hastening from Umbria to aid his colleague, arrived only to meet the same fate. Rome trembled, and imagined Hannibal already before its gates. (*Hannibal ante portas* became afterward a proverb.) Q. Fabius Maximus, a man who well deserved his surname, was proclaimed proditor by the senate, and the city was fortified. But the conqueror, who knew Rome and the power of its despair, having made an unsuccessful attempt to besiege Spoletum, resolved to detach the subjects and allies of Rome from its interest before attacking the city itself. He therefore crossed over to Picenum, and carried terror and devastation into the lands of the faithful confederates of Rome in central Italy. Fabius now marched against him, and, with that cautious slowness which won him the surname of Cunctator (the Slow),



closely followed all his motions, hovering around him like "a cloud on the mountains," deterring the towns from defection, but carefully avoiding the risk of a decisive battle. By thus keeping Hannibal continually at bay, he procured Rome time for greater armaments. Once he had even the good fortune to surround him closely in a narrow mountain pass; but Hannibal saved himself by having 2,000 oxen with burning fagots around their horns driven upon an eminence, which, making the enemy believe that a sally was intended on that side, induced him to quit one of his main positions. Dissatisfied with the slowness of Fabius, Minucius, his master of the horse, attacked the enemy in his absence at Geronium, and for a trifling success was rewarded by the people of Rome with an equal share in the supreme command. This emboldened him to attempt another attack, and he was soon ensnared and routed by Hannibal, being saved from total ruin only by Fabius, who hastened to the rescue of his rival. Hannibal regarded this as a defeat by Fabius. "I told you," he said, "the cloud of the mountains would shed its lightnings." He wrote to Carthage for reinforcements and money; the government refused to send any, for none were needed, his enemies said, after such victories. Hasdrubal, his brother, was fully engaged in Spain by the brothers P. Cornelius and Cneius Scipio. A decisive battle was deemed necessary by Hannibal to destroy the Roman confederacy. The rashness of C. Terentius Varro, one of the consuls of the year 216, soon offered an opportunity for striking a great blow, of which Hannibal well knew how to avail himself. The battle was fought in Apulia, on the fertile plains of which he had maintained his army through the winter, near Cannæ, on the banks of the Aufidus (Ofanto). The two consuls, L. Æmilius Paulus and Varro, commanded more than 80,000 men; the Carthaginian generals, Hannibal, Mago, Maharbal, Hanno, and another Hasdrubal, 50,000. Skilful disposition, stratagem, and the Numidian cavalry, decided the bloody day in favor of the latter. Æmilius Paulus, who died the death of a hero, 21 military tribunes, 80 senators, and numberless knights, were among the 50,000, or, according to others, 70,000 Roman victims of the carnage. Only scattered remnants escaped, among them Varro, who now received the thanks of the senate, *quod de republica non desperasset*. This indomitable spirit of the Romans, as well as his own heavy loss, still prevented Hannibal from following the advice of Barca to march immediately upon Rome. He was for the present satisfied with the possession of southern Italy, and entered Capua, which opened its gates, to give rest to his troops. But the rich and luxurious metropolis of Campania proved fatal to their discipline and health, and desertion thinned their ranks. Hannibal had passed the zenith of his good fortune. Marcellus, the sword of Rome, while Fabius continued to be its shield, repulsed him from Nola, and besieged and conquered Syracuse (214-212),

a newly gained ally of Hannibal, while another ally, Philip II. of Macedon, was prevented from fulfilling his promises. Hasdrubal in Spain fought with varying success, P. Cornelius Scipio, the son, recovering what his father and uncle had lost when they fell. Sardinia and the whole of Sicily were soon in the hands of the Romans, who began to harass the coasts of Africa. While Hannibal was effecting his successful march to Tarentum and its occupation (213), other towns were lost. Capua was besieged and hard pressed. Unable to dislodge the besiegers, he suddenly marched toward Rome, and really appeared before its gates (211), but this diversion remained fruitless. The siege of Capua was not raised, and both that city and Tarentum were lost, and after a victory at Herdonia (210), Hannibal had to keep himself on the defensive in Apulia, Lucania, and Bruttium. His most dangerous enemy, Marcellus, however, fell into an ambuscade near Venusia, and was slain (208). This was one of his last achievements in Italy. His hopes rested on the approach of his brother from Spain with a mighty army; but the consuls Livius and Claudius Nero, the latter of whom secretly hastened from the south, where he was observing Hannibal, to aid his colleague in the north, destroyed in the battle on the Metaurus (207) the new army and every hope of Carthaginian success. Hannibal, into whose camp the head of his brother was thrown by the Romans, now despaired of the result, but still continued the struggle, at least for the military honor of his country, in Bruttium, the southernmost peninsula of Italy, until he was recalled in 203 to Africa, which was now invaded by Scipio, the conqueror of Spain. Immediately on his return, after so many years of absence and victories, he created a new cavalry, and defeated Masinissa of Numidia, the ally of Scipio, but tried to induce the latter to negotiate. Their interview had no result, and Hannibal was obliged to accept a battle at Zama (202), in which his large but motley army of Carthaginians, Libyans, Ligurians, Gauls, and Macedonians, succumbed to the less numerous, but well organized and disciplined host of Scipio. The terror of an eclipse of the sun, and a panic among the mercenaries, chiefly caused this terrible defeat. The second Punic war was soon over: Rome dictated cruel and humiliating terms of peace, and Carthage accepted them (201). But Hannibal's career was not yet ended. Removed from military command through the influence of the Romans, he soon rose to the highest civil dignity in his state, and as *suffete* he evinced the same energy, boldness, and genius which distinguished him as a general. He detected, denounced, and abolished inveterate abuses, reformed the judiciary, reorganized the finances, restored the resources of the republic, and concluded new alliances. But his uncompromising hostility to the embezzlers of the public revenues and monopolizers of offices increased and embittered his personal enemies, who denounced his patriotic schemes at Rome, and with a Ro-

nan commission sent to Africa even concerted a plot against his life. He sought safety in flight, escaped from the city, sailed to Tyre, and hence went to the court of Antiochus the Great of Syria, whom he soon induced to declare war against the Romans, for which he was already arming. But though the king treated him with the utmost honor, he was prevented by intrigues, and a jealous anticipation of Hannibal's greater glory, from adopting his grand plans of a combined attack on Rome in Italy, as well as from giving him a proper share in the execution of his own. He was made commander of a fleet sent against the Rhodians, but failed in the expedition, though he personally distinguished himself. The Romans, having compelled Antiochus to an inglorious peace, asked the surrender of their old enemy, who was, however, informed in time to escape. He repaired to the court of Prusias, king of Bithynia, passing, it is stated, through Gortyna in Crete, where he saved his treasures, which nearly cost him his life, by placing sealed casks filled with lead under the protection of the avaricious inhabitants, while his gold lay concealed in hollow statues on the open floor of the vestibule. Anxious to induce Prusias to aid him in his plans against Rome, he is said to have gained a victory over the fleet of his enemy Eumenes of Pergamus. There, too, the Romans persecuted him; and no less a person than T. Q. Flaminius was sent to ask his surrender, and the Bithynian king was weak enough to command the arrest of his guest. But Hannibal was not unprepared, and determined to die a free enemy, and not a slave of the Romans. He took poison, and in his last hour expressed his contempt of his victorious but degraded enemies, and uttered imprecations on Prusias, their treacherous accomplice. He had kept his oath.

HANNO, a Carthaginian navigator, supposed to have flourished in the 5th century B. C. He was commissioned by the government of Carthage to explore the western coast of Africa, and to plant colonies there. Setting sail accordingly with 60 penteconters, or vessels of 50 oars each, he passed the pillars of Hercules, and voyaged along the African coast as far as lat. 8° N., according to some writers. On returning to Carthage, he caused an account of his voyage to be inscribed on a tablet, and then dedicated it in the temple of Cronos or Saturn. Of the contents of that tablet, known as a *Periplus*, we possess a translation, from which it appears that Hanno took with him a large body of colonists, and founded several cities to the N. of Cape Bojador. The geographical indications of the extent of this voyage are so vague that it is impossible to identify them. The first edition of Hanno's *Periplus* appeared at Basel in 1584, as an appendix to the edition of Arrian by Gelenius. It has also been published by Hudson in the first volume of his *Geographi Minores* (Oxford, 1698-1712); and in 1797 an English translation of it by Falconer was issued from the Oxford press.

HANNO, surnamed the Great, a Carthaginian general and statesman, contemporary with Hamilcar Barca and Hannibal, died in old age, after the battle of Zama (202 B. C.). While yet a very young man, he commanded a division of the Carthaginian army in Africa during the first Punic war, and took Hecatompylus, an opulent city of that continent. When the mercenaries returned from Sicily after the termination of the first Punic war, Hanno was deputed to propose to them that they should waive their right to a part of the arrears due them; and when they refused to accede to this proposition and took up arms to enforce their claim, he was appointed to command the army which was sent to subdue them. His military abilities were not, however, equal to the accomplishment of the enterprise, and in a little time Hamilcar, his political rival and opponent, was associated in the command with him. Hanno was afterward superseded by the suffrages of the soldiers, and a new colleague given to Hamilcar. This new general being soon after taken prisoner and killed by the mutineers, a formal reconciliation was effected between the two rivals, and Hanno was restored to his command. The fortune of war now turned against the mercenaries, who were defeated in a great battle, stripped of their strongholds, and at length completely subdued. From the termination of this war, Hanno figures rather as a politician than a warrior. He was the head of the aristocratic party at Carthage, and the great enemy of Hamilcar and his sons, whose views and policy he invariably opposed.

HANOVER, an E. co. of Va., drained by N. Anna and S. Anna rivers, which unite on its N. E. border to form the Pamunkey; area, 400 sq. m.; pop. in 1850, 15,153, of whom 8,398 were slaves. The surface is uneven, and the soil much diversified and capable of being improved. The productions in 1850 were 377,616 bushels of Indian corn, 157,888 of wheat, 94,186 of oats, 404,550 lbs. of tobacco, and 78,816 of butter. There were 24 grist mills, 2 saw mills, 8 tanneries, 2 manufactories of farming implements, 27 churches, and 345 pupils attending public schools. The Richmond and Potomac and the central railroads cross the county. Organized in 1790. Value of real estate in 1856, \$3,144,487, being an increase since 1850 of 85 per cent. Capital, Hanover Court House.

HANOVER, a township and village of Grafton co., N. H., on the E. bank of the Connecticut river, 55 m. N. W. from Concord; pop. in 1850, 2,352. The principal village is situated about  $\frac{1}{2}$  m. from the river, on an elevated plain, and is built around a public square of 6 acres, on which front the principal edifices. It is the seat of Dartmouth college and medical school. (See DARTMOUTH COLLEGE.) On the other side of the river is the town of Norwich, with which it communicates by a bridge. On the south of the park are the Tontine, a brick building of 150 feet in length, and the Dartmouth hotel. There are 4 churches (1 Baptist, 2 Congre-

gational, and 1 Episcopal), 18 school districts, an academy, 2 female seminaries, and 2 post offices, Hanover and Hanover Centre. The surface of the township is in some parts uneven, but the greater portion is admirably adapted for agriculture. The soil is fertile, and there is probably less waste land in Hanover than in any other part of the county. The Moose mountain, an elevated ridge, runs across the town from N. to S. about 5 m. from the Connecticut river. The Connecticut and Passumpsic rivers railroad passes on the opposite side of the river.

**HANOVER** (Germ. *Hannover*), a kingdom in the north of Germany, situated between lat. 51° 17' 27" and 53° 50' 58" N., and long. 6° 40' and 11° 32' E. It consists of two principal portions separated by Brunswick, and several smaller detached portions. The northern portion, which is nearly divided by Oldenburg, is bounded N. by the German ocean, E. by Holstein, Hamburg, Lauenburg, Mecklenburg, Prussia, and part of Brunswick, S. by Brunswick, Waldeck, Lippe-Detmold, Hesse-Cassel, and Westphalia, and W. by the Netherlands. The southern portion is surrounded by Brunswick, Prussia, and Hesse-Cassel. Enclosed within the territory of Hanover are Oldenburg, Bremen, and part of Brunswick. It is divided into 7 provinces (6 *Landdrosteien* and 1 *Berghauptmannschaft*), as follows:

Provinces.	Area in sq. m.	Pop. in 1855.	Capitals.
Hanover .....	2,326	352,686	Hanover.
Hildesheim .....	1,730	360,226	Hildesheim.
Lüneburg .....	4,586	843,814	Lüneburg.
Stade .....	2,620	235,666	Stade.
Osnabrück .....	3,411	259,521	Osnabrück.
Aurich (East Friesland) ..	1,154	184,261	Aurich.
Mining district .....	244	83,818	Clausthal.
<b>Total .....</b>	<b>14,811</b>	<b>1,819,777</b>	

According to the census of 1852, the population amounted to 1,819,253; from 1852 to 1855 there was therefore an increase in the population of only 524. Hanover is mountainous only in its southern portion, to which belongs the western part of the Hartz, with the Königsberg, 3,260 feet high, and the Bruchberg, 2,882 feet high. The rest of the territory consists of an immense plain with gentle undulations. In the S. the valleys are fertile. In the N. are many barren heaths (especially the heath of Lüneburg and the Humling in East Friesland) and moors. The most productive tracts are those along the river banks, which have been reclaimed from a marshy state. The coasts are below the level of the sea, from the encroachment of which they are protected by dikes. The rivers of Hanover are the Elbe, with its affluents, the Jetze, Ilmenau, Seeve, Este, Schwinge, Oste, and Medem; the Weser, which receives the Aller, the Wumme, Lessum, Aue, Delme, and Hunte; the Ems, with its branches, the Leda and Hase; and the Vechte. The lakes are those of Steinhude, Dümmer, Bodenteich, and Seeburg. The North sea forms at the mouth of the Weser the Dol-

lart bay. The climate is humid, mild in the north and cold in the south. The mean temperature of the year is 48.6°, the extremes being 64.6° and 32° F. The Hartz mountains afford silver (discovered in 968), iron, copper, lead, litharge, salt, peat, coal, alum, marble, and granite. The chief agricultural products are barley, oats, potatoes, rye, garden vegetables, tobacco, hops, chicory, flax, and hemp. There are large forests of firs in the Hartz and of oak and beech at Solling. Cattle are reared especially in East Friesland and the marshes, and in the Hartz. They are an important article of export. Horses are bred for exportation chiefly in East Friesland, Lüneburg, Bremen, Hoya, and Kalenberg, and there are studs at Celle, Herrenhausen, Memsen, Neuhaus, and Belra. Sheep and bees are found in the heath of Lüneburg. The inhabitants are by descent mostly Low Germans (Saxons); in the N. W. there are Frisians, and on the upper Elbe Wends, who however have long been Germanized. The Hartz contains also a colony of Francoconian miners. Agriculture is not very flourishing. Thread and linen manufactures are carried on in various parts of the kingdom, the principal seat of the latter being Osnabrück. The other manufactures, comprising coarse woollens, leather, paper, and glass, are small. On Jan. 1, 1854, Hanover joined the German *Zollverein*, which gave a new impulse to its commerce. The number of Hanoverian sea-going vessels in 1858 was 827, tonnage 100,000, and 4 steamers, tonnage 1,600; in the coasting and river trade, 2,200 vessels, tonnage 28,000, and 18 steamers, tonnage 1,600; employing altogether 7,600 sailors. The maritime trade is chiefly carried on in the ports of Emden, Harburg, and Leer. The chief exports are coarse linen, iron, and copper from the Hartz, timber cut into planks, and horses and black cattle from various parts of the country. The imports comprise English manufactures and colonial produce, linen, broadcloth, silk, and jewelry. Hanover has 441 m. of railroad, of which about 14 m. belong to private companies, and 3 canals, viz.: from Mappen to Lingen, from Aurich to Emden, and from an affluent of the Weser to an affluent of the Ems. According to the census of Dec. 3, 1855, Hanover contained 1,496,443 Lutherans, 94,804 Reformed, 216,144 Roman Catholics, 1,484 members of other denominations (Mennonites, Moravians, Baptists, &c.), and 11,453 Jews. Only the Lutherans, Reformed, and Roman Catholics enjoy full civil rights. The Lutherans have 5 consistories, at Hanover, Stade, Otterndorf, Osnabrück, and Aurich. The Reformed congregations, with the exception of 18 (14 of which are in the county of Bentheim and have a Reformed superior ecclesiastical board or *Oberkirchenrath* at Nordheim), are under the Lutheran consistories, and their oft repeated petitions for ecclesiastical independence have been as yet refused. The Roman Catholic church (in accordance with a papal bull of March 26, 1824) has 2 bishoprics, at

Hildesheim and Osnabrück. The latter was not filled until 1868. The kingdom has a university at Göttingen, an academy for young noblemen at Lüneburg, a *Pädagogium* at Ilfeld, a military school at Hanover, 17 gymnasia, 13 progymnasias, 21 polytechnic schools, several deaf and dumb institutions, 5 normal schools, a surgical school, a school of mines and forests at Clausthal, several commercial schools, 6 schools of midwifery, 2 veterinary schools, 8,561 town and country schools, beside a number of private schools, female academies, &c., especially in the eastern districts. All the higher institutions of learning (except the university) were placed in 1880 under a superior council in the town of Hanover. The primary schools bear a denominational character, and are almost exclusively under the jurisdiction of the 8 state churches.—Hanover is a hereditary monarchy, limited by two chambers of representatives who are chosen for a term of 6 years, and meet every other year, generally for 8 months. The first chamber consists of the princes of the royal house, the members of the higher nobility (2 dukes, 1 prince, and 8 counts), whose seat in the chamber is hereditary, several high officers of the state and of the Lutheran and Catholic churches, and 85 deputies of the lower nobility (*Ritterschaft*). The second chamber consists of several officers of the state and the two churches, one deputy of the university of Göttingen, 88 deputies of the towns, and 41 deputies of the landed proprietors. There are also 7 provincial assemblies, which have the right of participating in the provincial legislation. A state council, reorganized by royal decrees of Jan. 26 and Sept. 7, 1856, superintends the administration of the country for extraordinary cases. The ministry comprises 6 departments, those of war, of the royal household and foreign affairs, of finance, of religion and education, of justice, and of the interior. The chamber of domains at Hanover shares the administration of the finances with the minister of finance and commerce; and the college of the treasury (*Schatzcollegium*), consisting of a president, 3 members elected by the chambers, and the 2 secretaries of the latter, takes part in the administration of the public debt and of the taxes. The highest tribunal is the supreme court of appeal at Celle. There are 16 superior courts for civil affairs, and a state court established Oct. 7, 1865, in the town of Hanover, for the decision of questions affecting the constitutionality or validity of royal decrees. Trial by jury in criminal cases has been guaranteed since 1848. The system of public finances was divided by decree of March 24, 1857, into two departments, the royal treasury and the general convent treasury; the latter receives the income from all the suppressed convents and similar institutions, which is used exclusively for educational, religious, and charitable purposes. The public revenue, according to the budget for the year ending June 30, 1859, was 19,108,586 thalers, and the expenditures were 19,208,270 thalers,

showing a deficit of 94,684 thalers. The public debt on Jan. 1, 1858, amounted to 46,218,805 thalers, including a railroad debt of 80,000,000. The army consists of 26,988 men, of whom 8,078 are cavalry, 2,666 artillery, and 287 engineers. The contingent of Hanover to the federal army amounts to 15,280 men, 4,851 being reserve troops. It constitutes the main body of the 10th army corps.—The territory comprising the present kingdom of Hanover was anciently inhabited mostly by Saxons, the N. W. portions by Frisians, and the N. E. by Slavi. Charlemagne compelled the inhabitants to become Christians, and incorporated their territory with his empire. Under Louis the German it became a part of the new duchy of Saxony, to which it belonged until Henry the Lion was put under the ban of the empire. In 1235 his grandson Otho the Young was made duke of Brunswick-Lüneburg by the emperor Frederic II. This duchy was divided in 1267 by the sons of Otho the Young, Albert and John, the latter of whom founded the old line of Lüneburg, which became extinct in 1369. The descendants of Albert, to whom Lüneburg returned in 1369, divided the reunited land again in 1409 and 1428, and Duke Bernhard founded in the latter year the middle line of Lüneburg. This line was in 1569 again divided into the younger line of Brunswick-Lüneburg and the line of Brunswick-Lüneburg-Danneberg, the latter of which changed its name later into Brunswick-Lüneburg-Wolfenbüttel, and still reigns in the duchy of Brunswick. The younger line of Brunswick-Lüneburg split in 1641 into the line of Celle, which died out in 1705, and the line of Brunswick-Lüneburg-Kalenberg. A descendant of this latter line, Ernest Augustus, received in 1692, for himself and his descendants, the dignity of an elector. The new electorate soon received generally, instead of Brunswick-Lüneburg, the name of the electorate of Hanover. A son of the first elector, George Louis, great-grandson of James I., in 1714 inherited the throne of England as George I. From 1714 to 1837 Hanover had the same sovereigns as England, but its own independent administration. In 1715 the king of Denmark sold to George I. the duchies of Bremen and Verden, which were united with Hanover. By the peace of Lüneburg in 1801, Hanover received the bishopric of Osnabrück. During the continental wars Hanover underwent many changes. In 1801 its territory was occupied by Prussia, and from 1803 to 1805 by the French. In 1806 it was ceded by Napoleon to Prussia, but in the autumn of the same year was again partly occupied by the French. In 1810 Napoleon united it to the new kingdom of Westphalia, but toward the close of the same year the N. W. portion was again separated from Westphalia, united with France, and divided into the departments of Bouches de l'Elbe, Bouches du Weser, and Leine, while the S. E. portion formed the Westphalian departments of Atter and Hartz. After the expulsion of the French, the electorate was made

in 1814 a kingdom. In the same year the prince regent, George IV., convoked a general assembly of the states, in order to consolidate the varying constitutions of the several provinces. In 1819 a kind of constitution was given, based on old aristocratic principles. It was provided that, in the main, the chambers should exercise the same privileges as the former provincial deputies, that the provincial states should not be abolished, and that the regent should have power to change and modify the constitution. By the edict of Oct. 12, 1822, the government received a new organization, and the kingdom was divided into 7 districts. In 1831 disturbances broke out in Osterode and Göttingen, which however were soon quelled. In order to allay the general political excitement, the duke of Cambridge was appointed viceroy with very extensive powers. The assembly of the states, which met March 7, 1831, declared a speedy change of the constitution to be an urgent necessity. In the same year a committee, consisting of 7 royal commissioners and 14 members elected by the chambers, was formed to draft a new fundamental law. This draft was adopted by the assembly of the states in 1832, in spite of the opposition of a portion of the aristocracy, and on Sept. 26, 1833, was ratified by William IV. The new constitution put the two chambers on an equality, increased the number of deputies of the non-privileged states, made the ministers responsible, gave the chamber more extensive rights, and promised the liberty of the press. The death of William IV. in 1837 separated Hanover from England, as Victoria was excluded from the Hanoverian sovereignty by virtue of the limitation of the crown to heirs male. Ernest Augustus, duke of Cumberland, therefore succeeded to the throne. The new king abrogated the constitution of 1833, to which he had never given consent, and reestablished that of 1819. Seven professors of Göttingen (Dahlmann, Jakob Grimm, Wilhelm Grimm, Ewald, Gervinus, Albrecht, and Weber) were dismissed for refusing to take the oath of allegiance, and 3 of them expelled from the kingdom. The principal towns repeatedly invoked the interference of the federal diet in behalf of the constitution of 1833, but without success. On Aug. 6, 1840, the new constitution passed the assembly of the states. The king showed himself unflinching in his opposition to liberal reforms. The revolutionary movement of 1848 compelled him, however, like all the other German princes, to yield to the demands of the people. On Sept. 5, 1848, a new constitution, more liberal than that of 1833, was promulgated. The chambers of Hanover displayed great zeal in the reorganization of Germany; but when the king of Prussia declined the imperial crown, the Hanoverian representatives were recalled, May 13, 1849, from the diet of Frankfort. On May 26 the "alliance of three kings" was concluded at Berlin between Prussia, Hanover, and Saxony, for mu-

tual assistance and for promoting the unity of the German nation; but on the refusal of Bavaria and Wurtemberg to join this alliance, Hanover receded, and protested, by note of Dec. 30, in union with Austria, against the convocation of a diet at Erfurt. At the same time the nobility began an agitation for the recovery of their privileges and for the overthrow of the constitution; but the king adhered to his word. King Ernest Augustus died Nov. 18, 1851, and was succeeded by his only son, George V. On March 3, 1852, the diet called attention to 5 points in the constitution as incompatible with the treaties of Vienna, and demanded that they should be changed. The government complied with this demand by a decree of Aug. 4, 1855, which reestablished, with a few changes, the constitution of 1840. The opposition of the country to this change of constitution was weak and unsuccessful. On Nov. 7, 1856, an agreement was made by Hanover with Oldenburg, Brunswick, Lippe-Schaumburg, Hamburg, and Bremen, for the introduction of a common system of coinage. During the warlike preparations against Austria in 1859 the exasperation of the people led Napoleon III. to address a tranquilizing letter to the king of Hanover.

HANOVER (German *Hannover*), the capital of the above kingdom, situated on the Leine, which here becomes navigable, and is crossed by 10 bridges, 107½ m. by rail from Hamburg, 200½ m. from Cologne, and 104 m. from Cassel: pop., including military and suburbs, 62,000; exclusive of them, 35,000. On the left bank of the Leine lies the new town, on the right bank the old town, the *Ægidius New Town*, commenced in 1743, and the Ernest Augustus Town, commenced in 1845. The old town and new town were consolidated in 1824. It is encircled by 15 suburbs, which were partly united to the city, July 1, 1859. Waterloo place in the old town contains a bust of Leibnitz and the Waterloo column, which is 156 feet high and was erected in 1832. The city is surrounded by pleasant walks, instead of the former ramparts, which have been levelled. An aqueduct supplies the whole city with water by means of iron pipes. Herrenhausen and Monbrillant are country mansions of the royal family, the former one mile, the latter half a mile distant from the city. The Herrenhausen Walk is about 7,000 feet long, with 4 rows of linden trees. A delightful wood, the Eilenriede, beginning close before the gates of the town, and offering numerous walks, stretches in a large half circle round the city. Hanover is the residence of the king, the seat of the ministry, of the highest civil and military boards, and of a consistory. Both the general states of the kingdom and the provincial states of the principality of Kalenberg meet here. The city has 6 Lutheran, 1 Reformed, and 2 Roman Catholic churches, and a synagogue. The Schloss church (formerly a convent church of the Minorites) contains the remains of Henry the Lion and the tombs of the royal family. The castle was erected in

1636 as a residence, but is now only used for court festivals. The new royal court theatre accommodates more than 1,800 spectators. Among the other public buildings deserving of mention are the royal palace, the Ernest Augustus palace, the hall of the diet, and the polytechnic school. Hanover has societies for natural history, for the history of Lower Saxony, for arts, and for horticulture; societies of architects, engineers, artists, and mechanics; a museum, a royal library with 120,000 volumes and many MSS., and a rich cabinet of coins. The industry and commerce of Hanover have greatly increased of late years. In 1856 the Hanover bank was founded, with a capital of 6,000,000 thalers. The largest manufactories are in the suburb of Linden. A joint stock company for cotton spinning and weaving, with a capital of 1,800,000 thalers, employs 500 looms and 50,000 spindles; another joint stock company for mechanical weaving, with a capital of 1,200,000 thalers, employs 900 looms for moleskins, velvets, velveteens, &c. Hanover is connected by railway with Brunswick, Hildesheim, Cassel, Harburg, Bremen, Minden, and Emden. The date of the foundation of Hanover is not known. Henry the Lion resided there in 1168. Under his grandson, Otho the Young, Hanover appears as a flourishing free town. It is believed to have belonged after 1668 to the Hanseatic league. From 1637 to 1714 it was the residence of the house of Brunswick-Lüneburg, and since 1837 it has been the royal residence. Hanover is the birthplace of Herschel, Ifland, and the brothers August Wilhelm and Friedrich Schlegel. Leibnitz died and is buried there.

**HANSEATIC LEAGUE** (Old Germ. *Hansa*, a union), a commercial alliance of certain cities of Germany, for the protection of their trade. In the early part of the 13th century society in the north of Europe was in its rudest stage. The shores of the Baltic were occupied by Slavio tribes. Commerce, where it existed, was viewed by the sovereigns as a thing which ought to supply their own rapacity, rather than as a benefit to the realm. Petty lords followed the example, and levied exactions under the pretence of giving protection. The maritime cities of Germany were the chief sufferers from this condition of things. Those on the Elbe were especially the victims. The Genoese and Venetians possessed the monopoly of the Mediterranean and the East, and made those cities the depots of their northern traffic. The rich cargoes continually passing gave birth to swarms of pirates, who infested the narrow gateways of the Baltic. In 1289 an agreement was entered into between Hamburg, Ditmarsh, and Hadeln, to take means to keep the course of the Elbe and the adjacent sea free of marauders. This was the beginning of the famous Hanseatic league, although it is usually dated from the compact between Hamburg and Lübeck, in 1241, to provide ships and soldiers to clear the traffic way between the rivers Elbe and Travé, and the waters from Hamburg to the ocean,

and further to promote their mutual interests. When this partnership had been in operation 6 years, the city of Brunswick joined it. Other cities speedily sought admission, with their quota of men and money. The progress of the league was rapid. By 1260 it had so expanded that a convention was summoned to regulate its affairs, and thereafter its diet assembled triennially, with an extraordinary meeting decennially to renew the league. Lübeck was named the capital of the Hansa, and depositary of the common treasury and archives. Usually the meetings were held at Lübeck, but occasionally at Hamburg, Cologne, and elsewhere. The cities of the alliance were organized for administrative purposes into 4 circles: 1, the Vandalic or Wendish towns of the Baltic; 2, the Westphalian, Rhenish, and Netherlandish towns; 3, the Saxon and Brandenburg towns; 4, the Prussian and Livonian. The capitals of these circles were Lübeck, Cologne, Brunswick, and Dantzic. The number of cities, members of the league, fluctuated, but at the height of its power it comprised the following 85: Andernach, Anklam, Aschersleben, Bergen, Berlin, Bielefeld, Borsward, Brandenburg, Braunsberg, Bremen, Brunswick, Buxtehude, Campen, Cösfeld, Colberg, Cologne, Cracow, Culm, Dantzic, Demmin, Deventer, Dorpat, Dortmund, Duisburg, Eimbeck, Elbing, Elburg, Emmerich, Frankfurt-on-the-Oder, Golnow, Goslar, Göttingen, Greifswalde, Groningen, Halberstadt, Halle, Hamburg, Hameln, Hamm, Hanover, Harderwyck, Helmstedt, Hervorden, Hildesheim, Kiel, Königsberg, Lemgo, Lixheim, Lübeck, Lüneburg, Magdeburg, Minden, Münster, Nimeguen, Nordheim, Osnabrück, Osterburg, Paderborn, Quedlinburg, Revel, Riga, Roermond, Rostock, Rügenwalde, Saltzwedel, Seehausen, Soest, Stade, Stargard, Stavoren, Stendal, Stettin, Stolpe, Stralsund, Thorn, Ueltzen, Unna, Venloo, Warburg in Sweden, Werben, Wesel, Wisby, Wismar, Zutphen, and Zwolle. These cities were represented by delegates. On the rising of the assembly its edicts were communicated to the magistrates at the head of each circle, and were enforced with the strictness of sovereign power. Beside the ordinary members of the league, the commerce of other cities was more or less affiliated with it, but without representation or share in the responsibilities. Of such were Amsterdam, Antwerp, Dort, Ostend, Rotterdam, Bayonne, Bordeaux, Bruges, Dunkirk, Marseilles, Rouen, St. Malo, Barcelona, Oadiz, Seville, Lisbon, Naples, Leghorn, Messina, and London; but in the 14th century the kings of France and other potentates of the south ordered their merchants to withdraw from the association. The objects of the league were in the beginning legitimate, namely, the protection and expansion of commerce, the prevention of piracy and shipwreck, the increase of agricultural products, fisheries, mines, and manufactures. With these views they established 4 great factories or depots of trade, at London, in 1250; Bruges, 1252; Novgorod, 1273; and Bergen, 1278. From

these centres they were able almost to monopolize the trade of Europe. These factories were conducted with all the rigor of monastic establishments, the officers being bound, among other things, to celibacy and common board. The London factory, with branches at Boston and Lynn, gave the Hansards, as the merchants of the league were called, command both of the import and export market of Britain, while it enabled them to engross much of the carrying trade to the exclusion of British ships, which even at this date were beginning to be known on the seas. As it was difficult in the state of navigation at that time to make a voyage from the Mediterranean to the Baltic and back in one season, Bruges became the intermediate depot for the rich traffic with Italy and the Levant. Novgorod was the entrepot between the countries E. of Poland and the cities of the league; while Bergen secured to them the products of Scandinavia. The league was at its greatest power during the 14th and first half of the 15th centuries, but its objects were professedly different from those with which it set out, being now: 1, to protect the cities of the Hansa and their commerce from prejudice; 2, to guard and extend foreign commerce and to monopolize it; 3, to administer justice within the confederacy; 4, to prevent injustice, by means of assemblies, diets, and tribunals of arbitration; 5, to maintain the rights and immunities received from foreign princes, and, where possible, to extend them. Further, the league claimed to exercise a general judicial power, and to inflict the greater and lesser ban. In this change of principle may be traced the seeds of dissolution. The association framed for defence had become a confederation exercising a sovereign power and aiming at monopoly, negotiating treaties, and declaring war or peace. Not only did the league now exercise all acts of sovereignty, but it did so in the haughtiest manner. In 1348 the league fought and defeated the kings of Sweden and Norway, and Waldemar III. of Denmark. It deposed Magnus, king of Sweden, and gave his crown to his nephew Albert, duke of Mecklenburg. Again, in 1428, it declared war on Denmark and fitted out a fleet of 248 ships, carrying 12,000 troops. To such extent did it carry its arrogance that Niederhoff, a burgomaster of Dantzic, himself declared war against Christian of Denmark. When citizens of London, jealous of the privileges of the Hanse factory, insulted the employees of that institution, the league declared war against England, and compelled Edward IV. to grant yet more extravagant concessions. But influences were growing up which destroyed the league as rapidly as it rose. Its own efforts had abolished piracy, and left commerce safe on the ocean. Its own example, too, had taught states the value of the concessions they had hitherto disregarded. The league, in short, had laid the foundation of that commercial policy which has since become the basis of all political relations. Sovereigns, naturally jealous of a power whose military force rivalled their own,

began by modifying their previous grants, and ended by repealing them. Such was the case with England, which in 1597 withdrew all privileges from the Hansard merchants. The English and Dutch, finding themselves now strong enough to compel the right to trade in the Baltic, entered into it with little care for the interests of the Hansards. Meantime the league, finding its monopolies slipping away, made desperate efforts to retain them; and the cost becoming heavy, the maritime towns of the Baltic, so soon as direct trade was opened with the Dutch and English, seceded from the association. The discovery of the passage to India via the cape of Good Hope, and of America, turned the tide of commerce into new channels, and was the finishing blow to the existence of the league. Its last meeting was held in 1630 for the purpose of receiving the secession of the remaining members. Hamburg, Lübeck, and Bremen, to which was afterward added Frankfurt-on-the-Main, formed a new association under the name of the free Hanse towns.—See Sartorius, *Geschichte des Ursprungs der deutschen Hansa* (3 vols., Göttingen, 1802–8), continued by Lappenberg (Hamburg, 2 vols., 1830); and Burmeister, *Beiträge zur Geschichte Europa's im 16. Jahrhundert* (Rostock, 1848).

HANSEN, MORRIS CHRISTOPHER, a Danish author, born in Modum, July 5, 1794, died in Kongsberg, March 16, 1842. He studied at the university of Christiania, officiated as teacher in various schools of Denmark, and applied himself to the improvement of the methods of instruction, but was less successful in his new educational theories than in the publication of works on the Norwegian language, and other school books. His fame, however, rests chiefly upon his romances, the best of which is "Other of Brittany" (in which he takes the German writers of the romantic school, Fouqué and Tieck, as his models), and upon his popular stories and poems. He also wrote several dramas of great poetic merit, but unsuited to the stage. A select edition of his remains was published after his death in 1842, and a complete collection of his writings has been set on foot in Bergen since that time.

HANSEN, PETER ANDREAS, a German astronomer, born in Tondern, Schleswig, Dec. 8, 1795, has been since 1825 professor of astronomy and director of the observatory at Seeberg, near Gotha. He is best known by his investigations on the perturbations of the moon, and has written extensively on this and other branches of astronomical research. His theories about the perturbations of the planets found an opponent in Encke, and the controversy of the two astronomers was published in 1856 in the *Astronomischen Nachrichten*. Hansen's *Berechnung der absoluten Störungen der kleinen Planeten* (1856–7), and *Theorie der Sonnenfinsternisse* (1858) were published in Leipzig in the memoirs of the royal Saxon association of sciences.

HANSTEEN, CHRISTOPHER, a Norwegian astronomer, born in Christiania, Sept. 26, 1784.

He studied at the university of Copenhagen, and after teaching in a cathedral school near Frederiksberg, on the island of Seeland, was appointed in 1815 professor of astronomy and mathematics at Christiania. His work on terrestrial magnetism (Christiania, 1819) attracted general attention, and most of the subsequent magnetic observations were made according to its indications. After visiting London, Paris, Hamburg, and Berlin, he undertook in 1828-'80 a journey to western Siberia, at the expense of the government, to test his theories, and wrote a narrative of it. On his return the new observatory at Christiania was built under his direction, of which he has been director since 1833; and a magnetic observatory was added to it in 1839. He has taught mathematics also in the school of artillery and engineering, has superintended the triangulation of Norway since 1837, and has written text books of geometry and mechanics, and a number of scientific memoirs, most of which appeared in the *Magasin for Naturvidenskaberne*, of which he has been editor, in connection with Lundh and Maschmann, since 1828.

HANWAY, JONAS, an English philanthropist and author, born in Portsmouth in 1712, died in London, Sept. 5, 1786. The earlier part of his life was passed in mercantile pursuits as a partner in the house of Dingley and co. of St. Petersburg, in which capacity he visited Persia, and published, as the result of his observations, a "Historical Account of British Trade over the Caspian Sea, with a Journal of Travels," &c. (4 vols. 4to., London, 1753-'4). The favorable reception given to this work led him to continue the use of his pen, and in 1756 he published a "Journal of Eight Days' Journey from Portsmouth to Kingston-upon-Thames; to which is added an Essay upon Tea and its Pernicious Consequences;" which caused Dr. Johnson to remark that "Jonas acquired some reputation by travelling abroad, but lost it all by travelling at home." He wrote nearly 70 pamphlets, mostly devoted to philanthropic schemes, but not ranking high as literary productions. His fortune, which was not large, was mainly expended in charitable objects. On the solicitation of a number of merchants, Lord Butte, then premier, gave him office as a commissioner of the navy, which he enjoyed for many years. He was mainly instrumental in founding the London marine educational society, and the Magdalen society. He was the first man in England who ventured to brave public opinion by carrying an umbrella. His monument is in Westminster abbey.

HAPSBURG (Germ. *Habsburg*), originally, it is supposed, Habichtsburg or Hawk's Castle, a ruined castle of Switzerland, near Brugg, canton of Aargau, on the Wülpeberg, on the right bank of the Aar. It was built in the 11th century, and has given its name to the imperial house of Austria. The first count of Hapsburg was Werner II., a nephew of Werner, bishop of Strasbourg, who is represented by genealogists as a descendant of Ethico I., a duke of

Alemannia in the 7th century. The descendants of Count Werner augmented the possessions of their house until their acquisitions were divided by the brothers Albert IV. and Rudolph III. in 1233. Rudolph became the founder of the Lauffenburg line, which again separated into the Hapsburg-Lauffenburg and Kyburg branches, of which the former became extinct (in its male line) in 1408, and the latter in 1415. The line of Albert IV., on the other hand, became flourishing through his son Rudolph, who in 1273 was elected emperor of Germany, and, having conquered Ottocar of Bohemia, gave his provinces, Austria, Styria, and Carniola, to his son Albert, afterward the first German emperor of that name (died in 1308). Under the grandsons of the latter the line again separated into two branches, one of which, numbering among its members the emperor Albert II. (died 1439), became extinct in 1558, and the other ascended the throne of Germany in the person of Frederic III. (died 1493), whose descendants were now, after the acquisition of the Burgundian dominions, strong enough to make the German imperial dignity stationary and almost hereditary in their house down to the last hour of the German empire (1806). The successors of Frederic III. in that dignity were, of the male line, Maximilian I. (died 1519), Charles V. (abdicated 1556), Ferdinand I. (died 1564), Maximilian II. (1576), Rudolph II. (1612), Matthias (1619), Ferdinand II. (1637), Ferdinand III. (1657), Leopold I. (1705), Joseph I. (1711), and Charles VI. (1740); of the female line (Hapsburg-Lorraine), Francis I. of Lorraine, husband of Maria Theresa, daughter of Charles VI. (1765), Joseph II. (1790), Leopold II. (1792), and Francis II., who, having assumed the title of emperor of Austria in 1804 as Francis I., resigned the German imperial dignity in 1806. His successor in Austria was his son Ferdinand I. (1835-'48), after whose resignation his nephew Francis Joseph, son of the archduke Francis Charles, was declared emperor (Dec. 2, 1848). Through Charles V. (I.), who was the son of Philip, son of Maximilian I., and of Juana, daughter of Ferdinand and Isabella, the house of Hapsburg also ascended the throne of Spain, uniting with it the Burgundian provinces, while his brother Ferdinand I. succeeded in attaching to the German line the crowns of his brother-in-law Louis II., king of Hungary and Bohemia, after the death of the latter in the battle of Mohács against the Turks (1526). The Spanish line was continued by Philip II., Philip III., Philip IV., and Charles II., with whom it became extinct in 1700, and was followed, after a great struggle of succession against Austria, by the Bourbons. The chief Swiss possessions of the house were lost as early as the first quarter of the 14th century, when the Swiss confederation was formed; the rest were ceded to various cantons at later periods, the last as late as 1802.—One of the counts of Hapsburg, Geffery (Gottfried), settled in England in the 18th century, served



Henry III. in his wars, and assumed the surname of Feilding from the county of Rinfelding (Rheinfelden) in Germany. He became the progenitor of the Denbigh family, and among the titles of the present earl of Denbigh are those of Viscount and Baron Feilding and count of Hapsburg-Lauffenburg and Rheinfelden in Germany. Henry Feilding, the novelist, was a member of this family.

HARAR, an independent Mohammedan city of E. Africa, on the S. confines of Abyssinia, 175 m. S. W. from Zayla, and 219 m. W. from Berbera, in lat. 9° 20' N., and long. 42° 17' E.; pop. 8,000. It was visited and described in Jan. 1855, by Capt. R. F. Burton, author of "A Pilgrimage to El-Medinah and Meccah," who penetrated thither after a toilsome and perilous journey from the coast of the Indian ocean. It was founded by Arab invaders, who in the 7th century conquered and colonized the tract between the Red sea and the Abyssinian mountains. It is situated on the slope of a hill which falls gently from E. to W., and its site is about 5,500 feet above the level of the sea. On the E. side are cultivated fields; on the W. a terraced ridge laid out in orchards; on the N. is an eminence covered with tombs; while to the S. the city declines into a deep valley traversed by a mountain torrent. The climate, owing to the great elevation, is dry, mild, and equable. The city is about a mile in length, and half a mile in breadth. It is surrounded by an irregular wall, pierced with 5 large gates, and buttressed by rudely built oval towers. The wall and the houses are built of rough blocks of granite and freestone cemented with clay. The only large building is a mosque with two minarets. The streets are steep and narrow lanes strewn with rubbish and with heaps of rocks. The principal houses are of two stories, but the poorer classes inhabit thatched cottages. There are many small mosques without minarets. The city has a high reputation in that part of Africa for learning and sanctity; theology is the only science cultivated. The language of the city is a peculiar dialect spoken nowhere else; it is Arabic largely mixed with some indigenous African tongue, and contains no literature except songs and tales. The people are a distinct race, of an unprepossessing appearance, with coarse and sinister features and a yellowish brown complexion. The women are much better looking than the men, and have regular profiles, straight noses, mouths of a Caucasian type, and light yellow complexions. The national dress is composed of robes of cotton cloth, dyed blue, scarlet, and crimson. The women spin and weave, and cultivate the gardens, while the men occupy themselves in trade. The people are lax in their morals, and are especially addicted to intoxication with beer and mead. They are extremely bigoted, and hold all foreigners, but particularly Christians, in hatred and contempt. The wild and pagan Gallas occupy the surrounding country, and could easily capture and destroy the city, but

suffer it to exist for its commercial advantages to them. The principal exports from Harar are slaves, ivory, cotton, tobacco, wheat, honey, gums, and cotton cloths. The imports are American cottons, shawls, silks, brass, copper, cutlery, dates, rice, sugar, gunpowder, and paper. It is a place of rendezvous for slave caravans from all the surrounding countries; three caravans in a year, the principal of which numbers 3,000 persons, are sent to the port of Berbera on the Indian ocean. Provisions are plentiful and cheap, 120 chickens being sold for a dollar. Harar is governed by an emir or prince. In 1855, at the time of Burton's visit, the emir Ahmed, the then sovereign, was apparently dying of consumption, but no later intelligence has been received from the place, access to which is jealously guarded.—See Burton's "First Footsteps in East Africa, or an Exploration of Harar" (London, 1856).

HARBAUGH, HENRY, an American divine and author, born near Waynesborough, Franklin co., Penn., Oct. 28, 1817. His great-grandfather emigrated from Switzerland about 1736. His father was a farmer, and Henry spent his youth working on the farm until he was 19 years of age. He was fond of reading at an early age, saving all the little money that came into his possession for the purchase of books. In 1836 he got leave to go to the West with a view of learning the trade of carpenter. He worked 4 months as an apprentice, and afterward as a journeyman, always studying at night. For the next 3 years he taught school in the winter and attended an academy in the summer, and in 1840 entered Marshall college at Mercersburg, Penn., and at the same time studied divinity in the theological seminary at the same place. He was licensed and ordained in 1843, and became pastor of the German Reformed congregation in Lewisburg, Penn., continuing his literary studies with unabated industry. In 1848 he published "Heaven, or an Earnest and Scriptural Inquiry into the Abode of the Sainted Dead." This volume was well received, and has reached its 14th edition. In Jan. 1850, he commenced "The Guardian," a monthly magazine, still continued. In April, 1850, he was called to the pastorate of the First German Reformed church in Lancaster. In 1851 he published "The Heavenly Recognition, or an Earnest and Scriptural Discussion of the Question, 'Will we know our Friends in Heaven?'" and in 1853 he published "The Heavenly Home, or the Employments and Enjoyments of the Saints in Heaven." In 1854 Mr. Harbaugh published "The Birds of the Bible;" in 1857, a "Life of the Rev. Michael Schlatter;" in 1857-'8, "The Fathers of the German Reformed Church in Europe and America," in 8 vols., and shortly afterward "The True Glory of Woman, as portrayed in the Beautiful Life of the Virgin Mary." Mr. Harbaugh is also the author of "Union with the Church" (1858), and the "Plea for the Lord's Portion of a Christian's Wealth, in Life by Gift, in Death by Will."

**HARBY**, ISAAC, an American man of letters, born in Charleston, S. C., in 1788, died Nov. 14, 1828. He was the grandson of a lapidary of the emperor of Morocco, who fled to England and married an Italian lady, and whose son emigrated to South Carolina. After abandoning the study of law, he taught a school on Edisto island, and afterward was editor at different times of the "Quiver," "Investigator," "Southern Patriot," and other newspapers, and became favorably known as an essayist and dramatic critic. He was the author of several eloquent orations, and of plays entitled "Alexander Severus," the "Gordian Knot, or Causes and Effects" (1807), and "Alberti," founded on the life of Lorenzo de' Medici (1819); the two latter were successfully produced in Charleston. In 1828 he removed to New York, where he contributed to the "Evening Post" and other periodicals. A selection from his writings, with a memoir, was published at Charleston in the following year.

**HARDEMAN**, a S. W. co. of Tenn., bordering on Miss., and traversed by Hatchie river; area, about 550 sq. m.; pop. in 1850, 17,456, of whom 7,106 were slaves. It has a generally level surface, and a fertile soil. The productions in 1850 were 798,545 bushels of Indian corn, 113,505 of oats, 95,852 of potatoes, 124,827 lbs. of butter, and 15,065 bales of cotton. There were 85 churches, and 761 pupils attending public schools. The Hatchie river is navigable at high water from its mouth in the Mississippi to this county, which is also crossed by the Memphis and Charleston and the Mobile and Ohio railroads. Capital, Bolivar.

**HARDENBERG**, FRIEDRICH VON, better known under his pseudonym of NOVALIS, a German mystical and romantic author, born at his family estate of Wiederstett, Prussian Saxony, May 2, 1772, died there, March 25, 1801. He was educated at the gymnasium of Eisleben, and at the universities of Jena, Leipsic, and Wittenberg. He studied philosophy and jurisprudence, and prepared himself for the practice of the law, but accepted a business appointment in the salt works of Weissenfels. His delicate and sensitive mind received a fatal shock from the death in 1797 of a young lady, Sophie von Kuhn, upon whom he had bestowed his affections. The moral beauty of his life, the spiritual penetration and suggestiveness of some of his writings, and his enthusiastic love for the chivalric periods of Christianity and history, made him the idol of his friends; and although his works are but few and fragmentary, he holds a position in German literature as one of the chief representatives of the romantic school. A full collection of his writings was prepared by Friedrich von Schlegel and Tieck, and published in Berlin in 1802 (5th ed. 1838). An English translation of his principal work, *Heinrich von Ofterdingen*, appeared in Cambridge, Mass., in 1842, and a highly appreciative sketch of him was written by Thomas Carlyle.

**HARDENBERG**, KARL AUGUST VON, a Ger-

man statesman, born at Essenroda, Hanover, May 31, 1750, died in Genoa, Nov. 26, 1822. He was the son of a nobleman, received a brilliant academic education, travelled extensively abroad, and was for several years employed by the Hanoverian government, until an intrigue which he discovered between his wife, a Danish countess of Reventlow by birth, and an English prince, about 1788, caused him to leave Hanover after having chastised the royal *roué*, and to enter the service of the duke of Brunswick, with whom the will of Frederic the Great had been deposited. Hardenberg was deputed to deliver the will to his successor, Frederic William II. At that sovereign's recommendation he became in 1790 minister of the margrave of Anspach and Bayreuth, at the time when the French actress Clairon, who had ruled the margrave and his people for 17 years, was supplanted in his affections by Lady Craven, who, however, could only be won by marriage. Hardenberg, as ready to ingratiate himself with the ambitious Prussian king as with the dissolute margrave, effected the arrangement by which the territory of the latter was ceded to Prussia in 1791, in consideration of a large annuity, which enabled that prince to reside with Lady Craven in affluence in England. He was appointed Prussian minister of state in the new territories, and took possession of them in 1792. On the breaking out of the war with the French republic, the king appointed him administrator of the army, and in 1795 he was employed in completing the arrangements for peace with France. In 1797, on the accession of Frederic William III., he was intrusted with the direction of the affairs of Franconia. In 1804, after Bernadotte's invasion of Hanover, Hardenberg became prime minister, but only for a short time. His bold rebuke of Napoleon's invasion of the German territory irritated the emperor, who did not hesitate to assert that Hardenberg, being born in Hanover, was not inaccessible to bribery. The victory of Austerlitz, and the treaty of Presburg in 1805, had strengthened Napoleon's position, and humbled the power of Prussia. The king, through his fear of war, sacrificed his minister, and Haugwitz, the tool of France, was again appointed in his stead (April 1, 1806). The British government, however, distrusted him so much, that it continued to negotiate with Hardenberg. For a time he was appointed to the ministry of foreign affairs, when Niebuhr was among his colleagues; but Napoleon bluntly declared on July 4, 1807, that he would not conclude the peace of Tilsit unless Hardenberg was dismissed, and the latter withdrew accordingly. At the end of 1809, however, he consented that Hardenberg, who was a more supple but less upright man than Stein, should succeed him as prime minister. In 1810 he became chancellor of state, and inaugurated an entirely new policy. Permission was granted to citizens and agricultural laborers to acquire and possess real estate, and to the nobles to engage in industrial and commercial pursuits without prejudice to their dig-

nity. The burdens which hitherto lay exclusively upon the humbler classes were removed, the estates of the clergy were appropriated for the liquidation of the public debts, the army was reorganized, a new and improved system of national education was introduced, and harmony was restored between king, nobles, and people by an equal distribution of taxes and privileges. Finally serfdom was abolished, Sept. 24, 1811. Hardenberg contributed powerfully in rousing the enthusiasm of the Germans in 1813 against Napoleon, signed the treaty of peace in 1814 as the representative of Prussia, and in reward for his services was raised to the rank of prince (June 8), and presented with rich domains. He accompanied the allied sovereigns to London, attended the congress of Vienna, and took part in the treaties of Paris in 1815. In 1817 he organized the council of state, of which he became president, and was present on behalf of Prussia at the congresses. In the latter part of his administration he reformed the system of taxation, and regulated the national archives. He was censured for his lukewarmness in the representation of German interests at the congress of Vienna, for his excessive liberality toward the papacy in an agreement with the holy see, and for his backwardness in giving to Prussia a constitutional form of government. He left memoirs of his times from 1801 to the peace of Tilsit, which were deposited in the national archives, to be opened by the king in 1850; but they have not yet been published. The *Mémoires d'un homme d'état* (Paris, 1828; German translation, Leipzig, 1828), which contains some of his despatches, has been erroneously ascribed to him; Alphonse de Beauchamp is supposed to be the author. His biography was published by Klose in Halle in 1851.

**HARDICANUTE, HARDACANUTE, HARDECANUTE, or HARDKNUTE**, the last of the Danish dynasty of English kings, born about 1017, died in Lambeth, June 8, 1042. He was the son of Canute the Great by Emma, the widow of the deposed Saxon king, Ethelred II., and previous to the death of his father was made viceroy of Denmark. Upon the death of Canute he neglected to assert his right to the throne of England, but allowed his step-brother Harold to obtain Mercia and Northumbria, while Emma governed Wessex as the vicegerent of her son. Emma was finally obliged to retire to Bruges, and Harold held the whole country under obedience, Hardicanute meanwhile remaining in Denmark. Being urged by his mother to dispossess the usurper, he was about to sail to England for that purpose, when he was met by a deputation of English nobles, who informed him of the death of Harold, and offered him the crown. He reigned from 1039 to 1042, and died of surfeit at a marriage feast. He was a good-natured glutton, and his brief reign was a quiet one. He was never married, and was succeeded by his half brother Edward the Confessor.

**HARDIN**, the name of 5 counties in the United States. I. A S. W. co. of Tenn., bor-

dering on Ala. and Miss., and intersected by the Tennessee river; area, 768 sq. m.; pop. in 1850, 10,323, of whom 1,257 were slaves. The surface slopes on either hand toward the river, which is here navigable by steamboats. Iron ore and timber are abundant, and the soil is fertile in some parts. The productions in 1850 were 449,328 bushels of Indian corn, 40,273 of oats, 20,859 of sweet potatoes, 686 bales of cotton, 12,836 lbs. of wool, 62,246 of butter, and 6,098 of tobacco. There were 38 grist mills, 2 saw mills, 8 churches, and 1,410 pupils attending public schools. Capital, Savannah. II. A N. W. co. of Ky., bounded N. E. by Salt river and Rolling fork, and watered by branches of Green river; area, about 500 sq. m.; pop. in 1850, 14,502, of whom 2,459 were slaves. It has a hilly or an undulating surface and a fertile soil. The productions in 1850 were 885,520 bushels of Indian corn, 257,706 of oats, 285,028 lbs. of tobacco, and 39,513 of wool. There were 15 grist mills, 2 saw mills, 5 tanneries, 1 newspaper office, 27 churches, and 2,024 pupils attending public schools. Value of real estate in 1855, \$1,801,209. The county was organized in 1792, and is crossed by the Louisville and Nashville railroad. Capital, Elizabethtown. III. A N. W. co. of Ohio, intersected by the Scioto river; area, 476 sq. m.; pop. in 1850, 8,251. The surface is nearly level, and most of the soil is excellent. The productions in 1850 were 248,820 bushels of Indian corn, 84,468 of wheat, 33,907 of oats, and 19,726 lbs. of wool. There were 6 saw mills, 1 grist mill, 2 tanneries, 2 newspaper offices, and 754 pupils attending public schools. The county is crossed by the Mad river and Lake Erie, the Ohio and Indiana, and the Indianapolis, Pittsburgh, and Cleveland railroads. Capital, Kenton. IV. A S. E. co. of Ill., separated from Kentucky by the Ohio river; area, 260 sq. m.; pop. in 1855, 8,920. It has a high, broken surface, with a fertile soil, and abounds in lead and iron ores. The productions in 1850 were 164,400 bushels of Indian corn, 6,311 of oats, 2,718 lbs. of wool, and 6,644 of butter. There were 4 grist mills, 2 saw mills, 1 tannery, 7 churches, and 875 pupils attending public schools. The well known "cave in rock," on the Ohio river, is in this county. Capital, Elizabethtown. V. A central co. of Iowa, intersected by Iowa river; area, 576 sq. m.; pop. in 1856, 4,038. It is well timbered, has excellent prairie land, and contains coal, red sandstone, and fine white limestone. The productions in 1856 were 8,156 bushels of wheat, 11,540 of oats, 177,720 of Indian corn, 12,707 of potatoes, 2,449 tons of hay, 37,357 lbs. of butter, and 1,957 of wool. The county was first settled in 1851, and was named in honor of Col. John J. Hardin of Illinois, who was killed at Buena Vista. Capital, Eldora.

**HARDING, CHESTER**, an American portrait painter, born in Conway, Mass., Sept. 1, 1792. His family, who were poor, removed to Hatfield when he was 8 years of age, and 6 years later

to western New York. Here he divided his time between farm work and chair making. He served in the war of 1812, and afterward worked for a while at drum making for the army, having a contract with the U. S. government. He subsequently sold the right for the state of Connecticut of a patent spinning frame, and was engaged in cabinet making and other pursuits in Caledonia, N. Y., but was a sufferer by the financial distress which followed the war. Leaving his wife and infant child, he proceeded to the head waters of the Alleghany, and embarking on a raft went to Pittsburg and procured work at house painting, accumulated a small sum of money, and then set off on his return to his home, walking the whole way, guided only by blazed trees for nearly 200 miles. With his wife and child he again reached the Alleghany, and floated as before down to Pittsburg. Here for a time he endured great poverty, but by economy kept out of debt. He worked as a sign painter, and while thus occupied met with a man named Nelson, who painted the portraits of Mr. Harding and his wife, but would not permit his sitter to see him work, and refused to give him any information as to his art. Mr. Harding resolved to try himself, and, with such coarse paints as he had, made an attempt at his wife's picture. He showed it to Nelson, who pronounced it a dead failure, and added that he need try no more; but other critics declared it an excellent likeness, and made good their words by sitting for their own portraits. He soon afterward left Pittsburg, and went to Paris, Ky., where he painted upward of 100 portraits in 6 months, and then repaired to Philadelphia for better instruction in his art. Some two years later he returned to Caledonia, paid off all his old creditors, and bought a farm for his family. He afterward pursued his profession in various places, and in 6 months painted 80 portraits. He sailed for Liverpool on Aug. 1, 1828, and remained 8 years abroad. He next resided in Boston. In 1848 he again went to England. He now lives in Springfield, Mass. Among the distinguished persons who have sat to Mr. Harding may be mentioned Presidents Madison, Monroe, and J. Q. Adams, Chief Justice Marshall, Charles Carroll, William Wirt, Henry Clay, Daniel Webster, J. C. Calhoun, Washington Allston, &c., in America; David Ricardo, Samuel Rogers, Lord Aberdeen, the dukes of Norfolk, Hamilton, and Sussex, &c., in England.

HARDING, JAMES DUFFIELD, an English artist, born in Deptford in 1798. Although a facile and popular painter, he is best known in connection with his elementary publications on art, which contain many admirable lithographic prints of familiar objects in nature from sketches made by himself. He was also among the first to introduce the practice, now so common, of sketching on tinted paper, and of using opaque colors among the transparent ones in water color painting. He is also an accomplished architectural draughtsman. His "Lessons on Art,"

"Lessons on Trees," "Principles and Practice of Art," and other treatises for beginners, have a wide popularity.

HARDINGE, HENRY, viscount, an English soldier and governor-general of India, born in Wrotham, Kent, March 30, 1785, died at his residence, Southport, near Tunbridge Wells, Sept. 24, 1856. He entered the army as ensign of infantry in 1798, became lieutenant in 1802, and captain in 1804. He served under Sir Arthur Wellesley throughout the peninsular war, being part of the time on the staff of the commander-in-chief. On the retreat to Corunna he attracted the attention of Marshal Beresford, who gave him a brigade in the Portuguese service, which was afterward commuted for British rank. Hardinge used to say that this was the turning point in his fortunes, without which he might have died a colonel on half pay. From 1809 to 1818 he was deputy quartermaster-general of the Portuguese army. He was present at the battles of Roleia, Vimiera, where he was wounded, and Corunna, where he stood by the side of Sir John Moore when the latter received his death wound, at the passage of the Douro, the battle of Bussaco, and the lines of Torres Vedras. At the battle of Albuera it was Hardinge who suggested the charge which gained the day, although the friends of Sir Lowry Cole, the general in command of the wing which executed the manoeuvre, claim the merit for him. Hardinge was also present at the first and second sieges of Badajoz, at Salamanca, at Vittoria, where he was again wounded, at Pampeluna, at the battles of the Pyrénées, at Nivelle, Nive, and Orthez. On the renewal of hostilities in 1815 he was again on the staff of Wellington. At the battle of Ligny, where he acted as brigadier-general with the Prussian army, he lost his left arm, which prevented his presence at Waterloo. On his return to England he received the usual pension for his wounds, and was made a knight commander of the bath. At this time he was considered one of the best of Wellington's tried officers. His next prominent appearance was in civil life as member of parliament for Durham, to which position he was elected in 1820, and reelected in 1826. In 1828 he officiated as clerk of the ordnance, and in 1828, when Wellington came into power, was made secretary at war, which office he exchanged for the chief secretaryship of Ireland 2 years later. When Wellington went out Hardinge resigned, but was reinstated in office by Sir Robert Peel during his two terms of power in 1844-'5, and 1841-'4. In April, 1844, Sir Henry Hardinge was appointed to succeed Lord Ellenborough as governor-general of India, and in July following he entered into office at Calcutta. Tranquillity reigned throughout the Indian empire, owing in some measure to the previous warlike policy of Lord Ellenborough, and Hardinge had thus opportunity to devote himself to internal concerns. During the 4 years that he administered the government he was ceaseless in his endeavors to reform its abuses

and develop the legitimate resources of the country. Many checks on trade were removed, and taxation was more equally distributed. Merit alone was made the passport to promotion. Scientific exploration and enterprise were encouraged. No efforts were left untried to check infanticide and suttee. While setting an example of Christianity in his own person, and throwing the protection of the government around its observances, he discouraged secular officers from engaging in proselytism. He originated the policy which ended in the annexation of Oude, under his successor Lord Dalhousie. But in the midst of seeming prosperity the Sikhs were preparing an invasion of British territory from Lahore. The governor-general, having received timely information of their plans, collected a force of 32,000 men and 68 guns, and marched with it in person toward the threatened portion of the territory. On Dec. 18, 1845, learning that a large Sikh army had crossed the Sutlej, he issued a proclamation, and followed it up by immediately attacking the invaders. The battles of Moodkee, Ferozeshah, Sobraon, and Aliwal closed this short but hard-fought campaign of about 6 weeks, during which Hardinge, unwilling to snatch the honors of the field from his seniors in military rank, served as a volunteer under Sir Hugh Gough. The Sikhs were forced to bear the whole expense of the war and admit a British garrison into Lahore. For his services in this war he received the thanks of both houses of parliament, and a pension of £3,000 a year, and was raised to the peerage with the title of Viscount Hardinge of Lahore. The East India company gave him a pension of £5,000 a year, and he was also voted the freedom of the city of London. In Jan. 1848, he was superseded in his Indian government by Lord Dalhousie. In Feb. 1852, he was appointed master of ordnance by Lord Derby; and on the death of the duke of Wellington, in Sept. of the same year, he became commander-in-chief of the forces. In Oct. 1855, he was advanced to the rank of field marshal. His administration at the horse guards was not popular. Having become paralytic, he resigned in July, 1856. He was possessed of a genial temperament and buoyancy of spirit which rendered him personally popular, and his bravery was attested by 16 medals for service in as many pitched battles. He left two sons, of whom the elder had been his secretary and the younger one of his aides-de-camp in India.

**HARDNESS**, the quality in solid bodies by which their particles resist a force, as that of a sharp-pointed instrument, applied upon the surface to impress or remove them. Its comparative degrees in different substances are tested by attempting to scratch one with the other, or touching each in succession with a file or knife blade. In mineralogy it is one of the important tests by which species are distinguished; and its degrees are expressed by numbers referring to the scale of Mohs, the German miner-

alogist, which commences with the soft mineral talc, and ends with diamond, the hardest of all substances. It is as follows:

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|----------------------------------|---|
| 1. Talc, laminated light green.  | 6. Feldspar (orthoclase), white, cleavable. |
| 2. Gypsum, crystallized.         | 7. Quartz, transparent.                     |
| 3. Calcareous spar.              | 8. Topaz, transparent.                      |
| 4. Fluor spar.                   | 9. Sapphire, cleavable rhombohedron.        |
| 5. Apatite, transparent variety. | 10. Diamond.                                |
| 5. Scapolite, crystalline.       |   |

Breithaupt introduces another degree between 2 and 3, and again between 5 and 6, making the scale consist of 18 degrees. Owing to the loose state of aggregation of the particles in some minerals, these are easily removed, and the specimens may consequently be erroneously referred to low degrees of hardness, when a more careful examination would show that they are capable of scratching the smooth surface of other bodies of known high degrees of hardness. Brittleness or a tendency to fracture is a quality to be distinguished from hardness. Pure crystals are to be selected when practicable for establishing the hardness of mineral species, and it should be observed whether dissimilar faces of the crystal give different or the same results.

**HARDOUIN, JEAN**, better known as **Père HARDOUIN**, a French Jesuit, celebrated for his learning and his paradoxical opinions, born in Quimper, Brittany, in 1646, died in Paris, Sept. 8, 1729. He entered the order of Jesuits at the age of 20, and after teaching rhetoric for some time, went to Paris to finish his classical studies. Being intrusted with the preparation of Pliny's "Natural History" for the Delphin series of classics, then in progress, he discovered that a knowledge of numismatics was requisite for a clear elucidation of the text, and by assiduous study made himself a thorough master of the science. His edition of Pliny was published in 1685 (5 vols. 4to.), and met with the highest commendations of the learned throughout Europe. Huet observed of it that Père Hardouin had completed in 5 years a work which would have occupied 5 other savants 50 years. Eased with his sudden fame, Hardouin embroiled himself in bitter controversies by speaking with contempt of all other antiquaries, and endeavoring to support his positions by the most startling theories. In his "Chronology Explained by Medals" (2d part, 1697) he maintained that of all the ancient classics none are genuine but Homer, Herodotus, Cicero, Pliny the Elder, the Georgics of Virgil, and the satires and epistles of Horace; and that with the aid of these the monks of the 13th century had fabricated all the others, and reconstructed ancient history. The *Æneid* he regarded as an allegory of the progress of Christianity, and explained its several parts accordingly. The work was suppressed by order of parliament, but surreptitiously reprinted without change. In 1708 he was compelled by his superiors to recant his opinions, but he still clung to them, and reproduced them in subsequent works. In 1715 he published in 13 vols. fol. his great *Conciliorum Collectio*, with the preparation of which he had been charged by

the general assembly of the clergy of France. It embraces the councils held from the year 840 to 1714, including more than 20 whose acts had not before been published; but Père Hardouin is accused of having suppressed some important pieces and replaced them by apocryphal passages. At the request of 6 doctors of the Sorbonne the parliament arrested the sale of the work, and caused a number of leaves to be cancelled. Notwithstanding his labor on this collection, Hardouin regarded all the councils prior to that of Trent as chimerical. His other works include *Chronologie de l'Ancien Testament* (1677); *Nummi Antiqui Populorum et Urbium* (1684); *De Nummis Antiquis Colonialium et Municipiorum* (1689); *De Nummis Samaritanis*, and *De Nummis Herodisadum* (1691); *Chronologia ex Nummis Antiquis instituta* (1698); *Commentaire sur le Nouveau Testament*; *De la situation du paradis terrestre*; *Opera Selecta* (1709), &c.

HARDWICK, CHARLES, an English theologian, born in 1821, died Aug. 18, 1859, from an accident in ascending the Pyrénées near Bagneres de Luchon. He was a fellow of St. Catherine's hall, Cambridge, where he resided and held the office of Christian advocate in the university. In 1853 he was appointed professor of theology in Queen's college, Birmingham; in 1855, divinity lecturer at Cambridge; and a few months before his death, archdeacon of Ely. He published "History of the Articles on Religion" (London, 1851; 2d ed. 1859); "Twenty Sermons for Town Congregations" (1853); "History of the Christian Church in the Middle Ages"; "History of the Christian Church from Gregory the Great to the Reformation" (1856), &c. He commenced a work entitled "Christ and other Masters," comparing Christianity with other forms of religion, of which 4 parts had appeared (1855-'8), the 1st introductory; the 2d, the religions of India; the 3d, of China, America, and Oceania; and the 4th, Egypt and Medo-Persia. He also prepared an edition of the Anglo-Saxon and Northumberland version of the Gospel of St. Matthew, and was connected with other literary enterprises.

HARDWICKE, PHILIP YORKE, first earl of, an English lawyer, born in Dover, Dec. 1, 1690, died March 6, 1764. During his studies at the Middle Temple he became acquainted with Lord Chief Justice Macclesfield, who employed him as companion and tutor to his sons, and used his influence to push him forward at the bar. The partiality which Lord Macclesfield showed him in court was even the subject of complaint in the profession. He was called to the bar in 1715, and when his patron was made lord chancellor in 1719 he entered parliament as member for Lewes, the expenses of his election being defrayed by the government. The next year he was appointed solicitor-general; soon afterward he was knighted; in 1724 he became attorney-general, in 1738 lord chief justice of the king's bench and Baron Hardwicke of Hardwicke, and in 1787 lord chancellor. During the whole period of his public life he enjoyed

the highest reputation for integrity and wisdom. But 8 of his chancery judgments were appealed from, and those were confirmed. During the king's absence in 1740, '48, and '52, he was one of the justices chosen to administer the government; and in 1746 he was named lord high steward of England to preside at the trial of the rebel Scottish lords, Kilmarnock, Cromartie, Balmerino, and Lovat. In 1754 he was created Viscount Royston and earl of Hardwicke. When the duke of Newcastle went out of office in Nov. 1756, he resigned the great seal and passed the rest of his life in retirement.

HARDY, a N. co. of Va., bordering on Md., drained by Cacapon and Lost rivers and the N. and S. branches of the Potomac; area, 1,400 sq. m.; pop. in 1850, 9,543, of whom 1,260 were slaves. It has a mountainous, rocky surface, being crossed by ridges of the Alleghanias, and lying partly on the W. slope of North mountain. It has valuable mines of iron ore, and contains many fertile valleys. The productions in 1850 were 327,846 bushels of Indian corn, 85,225 of wheat, 3,862 tons of hay, 119,686 lbs. of butter, 1,197 of tobacco, and 32,176 of wool. There were 21 grist mills, 18 saw mills, 4 wool carding mills, 5 tanneries, 1 newspaper office, 18 churches, and 623 pupils attending public schools. Value of real estate in 1856, \$3,889,191, showing an increase since 1850 of 46 per cent. Capital, Moorefield.

HARE, the name of the small rodents of the family *leporidæ*, and the genus *lepus* (Linn.), which includes also the rabbits. This has fewer species than most other families of rodents, and presents the exceptional characters of large openings of the skull, an imperfect condition of the palate, the nasal process of the superior maxillary perforated, large orbits meeting in the middle line of the cranium, small temporal fossæ, and an increased number of incisor and molar teeth; the scapular spine has a long acromion process, sending down a considerable branch at right angles; there are 5 toes on the fore feet and 4 on the hind; the ears are very large, as long as or longer than the head; the tail short and bushy, either rudimentary or carried erect; hind legs much longer than the anterior, and formed for leaping; the stomach is simple, or partially divided internally, and the cæcum very long and divided into numerous cells by tendinous bands; a part of the inner surface of the cheeks is clothed with small hairs. Hares are found in all parts of the world except Australia, but most abundantly in North America, and chiefly confined to the northern hemisphere, extending even into the polar regions. For full particulars on the various species see "Waterhouse's Natural History of the Mammalia," vol. ii., pp. 9-147; for the American hares see vol. viii. of the "Pacific Railroad Reports," in which Mr. Baird proposes several divisions founded on the size, proportions, and curvature of the skull, and the size and divergence of the post-orbital processes. There are only 2 genera of the family, *lepus* and *lagomys*;

the latter will be described under PIKA. The genus *Lepus* has the following dental formula: incisors  $\frac{1}{1}$ , and molars  $\frac{2}{2}$ , a larger number than in other rodents; 2 small incisors are placed behind the principal pair, which are grooved in front, all being white, and not as deeply as usual implanted in the alveoli; the molars are rootless. There seems no osteological difference between hares and rabbits; the latter, however, are gregarious and make burrows in which the young are raised, while the former are more or less solitary, and merely make "forms" of grass on which they sit; rabbits are born blind and naked, but hares are said to have the eyes open and the body covered with hair at birth. The distinction being based chiefly on habits, there are hardly any species in America like the rabbit of Europe (*L. cuniculus*, Linn.), unless they be the gray rabbit (*L. sylvaticus*, Bach.) and the jackass rabbit (*L. caprolia*, Wagler); and it is not certain that any other old world *Lepus* has the habits and peculiarities of *L. cuniculus*. The last 3 species will be noticed under RABBIT. The common hare of Europe (*L. timidus*, Linn.) has ears longer than the head, fringed anteriorly with long hair; the fur mottled with black and ochrey brown, with rufous tints on the neck and outer side of limbs; the abdomen, inner side of limbs, and tail white; upper surface of tail and ears black; length from tip of nose to root of tail, along the curve of the back, 28 inches; weight, 8 to 12 lbs. Black and white varieties sometimes occur, but the color is not changed in winter as in the varying northern hares. This species is found generally throughout Europe, except in the coldest parts. The timidity of the hare is proverbial, and its speed made it a favorite object of the chase from the times of the Romans; the principal use of the greyhound is to pursue this animal. The eyes are lateral and prominent, and vision extends to objects on all sides at once; a very acute sense of hearing and smell and great speed are given for further protection against its numerous enemies; the palms of the feet are covered with hair; the nostrils are circular, almost hidden by a fold which may be closed; the upper lip is cleft; the opening of the ears can also be closed; the mammae are 10. They are able to reproduce at a year old; the period of gestation is 80 days, and from 2 to 5 are produced at a birth. They remain quiet during the day in their form or seat, which is a mere depression in the ground near some bush, coming out toward evening in search of food; the color so much resembles that of the objects among which they rest, that, as if conscious of the resemblance, they will generally remain quiet in their form until they are almost trodden upon. This species readily takes to the water, and swims well; it sits upon its tarsi, and uses its fore paws in holding food and cleansing its fur, though, from its incomplete clavicles, less perfectly than in the clavicated rodents; it drinks lapping, and can bite severely. Early in spring the sexual appetite is very strong, and the animal acts so

strangely that "to be as mad as a March hare" has become a proverb. Its intelligence is limited, but its instincts in avoiding its enemies are remarkable. The hare and rabbit were ranked among ruminating animals by the Mosaic law, but were forbidden to the Jews because the hoofs were not divided; Moses probably called the hare a ruminant from the partial division of the stomach, and the evident lateral movement of the lower jaw; Waterhouse confirms the statement of the Jewish lawgiver, and says the motion of the jaws must be chiefly lateral, as the crowns of the molars are never worn flat as in other rodents with rootless molars. The food of the hare is entirely vegetable, and its flesh is delicate, nutritious, and universally esteemed.—The varying hare (*L. variabilis*, Pall.) is smaller than the common species, with smaller and less black ears, shorter tail, and without the mottled appearance and white mark on the cheek of the latter; in summer the general color is rusty brown, finely pencilled with black and rufous yellow above, and impure white below; tail white, grayish above. In winter the fur is white, with ears black-tipped, the change of color being due to the cold of the season in the northern regions which it inhabits. It is found in northern Europe and Asia as far as the arctic ocean, but is wanting in central Europe except in Alpine regions. Twenty other species of hare are described by Waterhouse in Europe, Asia, and Africa.—Among the American species which grow white in the winter is the polar hare (*L. glacialis*, Leach), the largest of the family, exceeding a large cat; it measures about 2 feet to the root of the tail, the latter being about  $2\frac{1}{2}$  inches, and the ears about 4. The color in winter is pure white, with the ears black-tipped before and behind, and the soles dirty yellowish white; in summer it is light brownish gray above varied with black, rump and upper surface of tail dark plumbeous, ears glossy black with whitish posterior margin, and below whitish with a sooty tinge; the head is arched and wide, the ears broad, the tail short and hardly perceptible amid the dense hair; the fur is soft, fine, and full. This much resembles the European *L. variabilis*, and is distinguished chiefly by greater blackness of the ears; it is found in arctic America, and as far south as Newfoundland, in the most desolate and sterile regions, defying the inclemency of the polar winter; it feeds on berries, bark, twigs, and evergreen leaves; it is not very shy, though difficult to take in its favorite snowy localities; its range probably extends from Greenland to Behring's strait. Indians, trappers, and arctic travellers have often been saved from starvation by this beautiful animal. Its eyes are adapted for the twilight and auroral light of the polar countries, which, with the brightness of the pure snow, are always sufficient for its needs; its flesh is said to be delicious; from the shortness of the arctic summer this species produces young but once a

year, from 3 to 6 at a birth; the fur is softer than the finest wool; its summer pelage does not last more than 3 or 4 months. The weight, in good condition, is from 10 to 14 lbs.—The northern hare, sometimes called white rabbit (*L. americanus*, Erzl.), is a little smaller than the last; the color in winter is whitish, but the hairs at the root are gray and pale yellow in the middle; in summer the general hue is reddish brown, pencilled with black above, and the under parts white, very much like that of the *L. timidus*. It is found in the eastern portions of the continent from Pennsylvania and Virginia as far as lat. 68° N.; its favorite haunts are thick woods, where it is hunted with difficulty by dogs; its food consists of grasses, bark, leaves, young twigs, buds, and berries, and, in a domesticated state, of vegetables and fruits. This is the swiftest of the American species, and has been known to clear 21 feet at a single leap; like other hares and rabbits, it is in the habit of beating the ground with the tarsi, when alarmed or enraged; it is fond of pursuing a beaten path in the woods, and is often snared in such places. Its flesh is not much esteemed. Its enemies, beside man and dogs, are the lynx and other carnivorous mammals, hawks, owls, and even the domestic cat. It is more fierce than the rabbit, and will bite and scratch severely. The skin is very tender, and the fur little valued by furriers; the hind feet are used by the latter in finishing his fabrics.—The red hare (*L. Washingtonii*, Baird) is found on the N. W. coast; the prairie hare (*L. campestris*, Bach.), a large species, changing to white in winter, in the great plains of the Missouri and as far as the Columbia river; and the California hare (*L. Californicus*, Gray) on the Pacific coast.—The swamp hare (*L. aquaticus*, Bach.) is as large as the northern species, with long ears and tail; dark grayish brown above and white below; it is strong and swift; the fur is coarse and glossy; the feet are not densely clothed with hair, but the toes are slender, with small pads, pointed, and with visible claws. This species prefers low marshy places, in the vicinity of water, to which it is fond of resorting; it is an excellent swimmer, subsisting chiefly on the roots of the iris and other aquatic plants; when started, it suddenly leaps from its form, and makes for the nearest water, seemingly conscious that in that element all traces of its scent will be soon lost; it is fond of hiding beneath the roots of trees overhanging the water, in hollows under river banks, and in decayed trees. It is most abundant in the swampy tracts bordering on the Mississippi and its tributaries in the S. W. states; it has not been seen E. or N. of Alabama, according to Bachman.—The marsh hare (*L. palustris*, Bach.) is smaller than the rabbit, with short ears and tail; the legs are short and the feet are thinly clothed with hair; the general color above is yellowish brown, beneath gray; the eyes are remarkably small. It is found in the maritime districts of the southern states, espe-

cially in the neighborhood of rice fields; in these miry and unwholesome swamps, "surrounded by frogs, water snakes, and alligators, this species resides throughout the year, rarely molested by man." It is an excellent swimmer, and is perfectly at home in the miry pool and boggy swamp; it runs low on the ground, and is rather slow and clumsy in its motions. Its flesh is considered superior to that of the gray rabbit. Like other species of the genus, it is infested in the summer and autumn with the larvae of an *asotus*, which penetrate the flesh and keep the animal lean from constant irritation. Its food consists principally of roots, bulbs, and twigs of plants growing in marshes. It breeds several times a year, having from 5 to 7 at a birth; the young are placed in a kind of nest, made of rushes and lined with hair. Several other species of hare are described by Waterhouse and Baird.

HARE, JULIUS CHARLES, an English divine, archdeacon of Lewes, born at Hurstmonceaux, Sussex, Sept. 13, 1795, died there, Jan. 23, 1855. He was the son of the Rev. Robert Hare, rector of Hurstmonceaux, and the grandson of the learned bishop Francis Hare. After passing much of his time on the continent, he studied at the Charterhouse, whence he was removed in 1812 to Trinity college, Cambridge, where he remained, with a brief interval, for 20 years, being graduated bachelor in 1816, and master in 1819; he became a fellow in 1818, and assistant tutor in 1822. During this period he applied himself especially to classical and philological learning, German literature, and the writings of Coleridge and Wordsworth. In 1827 appeared the first series of "Guesses at Truth, by Two Brothers," a volume of miscellaneous apophthegms and reflections, the joint production of himself and his elder brother, Augustus William. A second edition appeared in 1838 with additions by himself, and from the posthumous papers of his brother; and a second series was subsequently published (2d ed. 1848). At Cambridge he likewise united with Thirlwall in translating the first two volumes of the 2d edition of Niebuhr's "History of Rome" (1828-'32), and he published in 1829 a vindication of the work from the charges of the "Quarterly Review." He also contributed largely to the "Philological Museum." His rugged style and odd spelling of some words led Sir William Gell to allude to him punningly as *Julius Hærutus*. In 1832 he was instituted to the rectory of Hurstmonceaux, the advowson of which was in his family; was appointed archdeacon of Lewes in 1840; was collated to a prebend of Chichester in 1851; and was nominated a chaplain to the queen in 1853. Soon after settling at Hurstmonceaux he married the sister of his friend the Rev. F. D. Maurice, and began his intimacy with Chevalier Bunsen, who dedicated to him, "as a monument of a life-long friendship," the first volume of his "Hippolytus and his Age." Though he devoted himself faithfully and



zealously to the duties of his office, he achieved his least successes as a preacher and parish minister. Even the sermons which he delivered before the university of Cambridge, where he had an audience most suited to his style of thought and expression, were somewhat impatiently listened to, and the effect of his official charges was marred by their prolixity. His mental cast and habits fitted him less for the pulpit than for his study, surrounded by a library which ultimately covered nearly all the walls of his rectory. It was chiefly in the ecclesiastical controversies of his time that he exhibited the character of an original and profound thinker, and his personal influence was such that he was sometimes called the leader of the Broad church party of the Anglican church. Many of his charges were controversial discussions. His collected works would form a commentary on the leading events of the last quarter of a century having special reference to the church of England. Beside several volumes of sermons, his principal later publications were the "Means of Unity, a Charge, with Notes" (1847); the "Duty of the Church in Times of Trial, a Charge, with Notes" (1848); the "True Remedy for the Evils of the Age, a Charge, with Notes" (1850); a "Letter to the Hon. R. Cavendish, on the recent Judgment of the Court of Appeal as affecting the Doctrine of the Church" (1850); the "Contest with Rome, a Charge, with Notes" (1852); a "Vindication of Luther against some of his recent English Assailants" (1854), among whom were Hallam in his "Literary History of Europe," J. H. Newman, W. G. Ward, and Sir William Hamilton; and an edition of the "Essays and Tales of John Stirling, with a Memoir" (2 vols., 1848), which gave so little satisfaction to Mr. Carlyle that he wrote a rival "Life of Stirling."—**AUGUSTUS WILLIAM**, brother of the preceding, and associate author of the first series of "Guesses at Truth," born in 1794, died in Rome, Feb. 18, 1834. He was a fellow of New college, Oxford, and became rector of Alton-Barnes in 1829. Before his decease, says his brother, he had nearly ceased "guessing at truth," in order to devote himself to the duties of his profession, and his "Sermons to a Country Congregation" (2 vols., London, 1837; 7th ed. 1851) were pronounced by the "Edinburgh Review" to be, "for an illiterate audience, an audience of rustics, perfect models of what discourses ought to be."

**HARE, ROBERT**, an American chemist and physicist, born in Philadelphia, Jan. 17, 1781, died there, May 15, 1858. His father, an English emigrant, settled in Philadelphia, and married an American lady. He established there an extensive brewery, and his son in early life managed the business. His tastes, however, led him away to scientific pursuits. He attended the courses of lectures on chemistry and physical sciences, and before he was 20 years of age he joined the chemical society of Philadelphia. At this early age he communicated

to the society a description of his first and most important scientific invention, the oxyhydrogen blowpipe, which he then called the hydrosat-iq blowpipe, and which was afterward named by Prof. Silliman the compound blowpipe. His memoir, published in 1801, appeared the next year in Tilloch's "Philosophical Magazine" (London), and also in the *Annales de chimie* (1<sup>re</sup> series, vol. xlv.). At this period the subject of combustion was very imperfectly understood, and even Lavoisier, who had discovered that heat sufficiently intense to fuse alumina might be obtained by directing a jet of oxygen upon charcoal, and who had burned the elements of water together to produce this fluid, failed to discover that by this union of hydrogen and oxygen in combustion the most intense degree of heat known might be obtained. By means of this apparatus Dr. Hare was the first to render lime, magnesia, iridium, and platinum fusible in any considerable quantity; and he is perhaps the only one who has obtained calcium in a pure metallic state, and strontium without alloy of mercury. In addition to these discoveries, Dr. Hare first announced that steam is not condensable when combined in equal parts with the vapor of carbon. For the invention of the blowpipe Dr. Hare received the Rumford medal from the American academy at Boston. In the article **BLOWPIPE** the subject is more particularly treated, and the attempts are noticed that were made in England to deprive Dr. Hare of the credit of the discovery. In 1818 Dr. Hare was appointed professor of chemistry in the medical school of the university of Pennsylvania, and continued in this office till his resignation in 1847. His course of instruction was marked by the originality of his experiments and of the apparatus he employed. His instruments, often designed and sometimes made by himself, were furnished in the greatest profusion, and always of large dimensions and of the most perfect plans; no expense nor personal labor was spared to render every piece of apparatus as complete as possible. The great collection which he accumulated he bestowed, after resigning his office in the university, upon the Smithsonian institution, of which he was one of the few life members. One of the most useful small instruments of his invention is that called the valve cock or gallows screw, by means of which perfectly air-tight communication is made between cavities in separate pieces of apparatus. To his zeal and skill in devising and constructing improved forms of the voltaic pile, as remarked by Prof. Silliman ("Journal of Science," 2d series, vol. xxvi. p. 108), American chemists are indebted for the distinguished success they attained in applying the intense powers of extended series of voltaic couples long in advance of the general use of similar combinations in Europe. In 1816 he invented the calorimotor, a form of battery described in **ELECTRO-DYNAMICS**, by which a large amount of heat is produced with little intensity. With the modified form of it called the deflagrator, devised in 1820, Prof.

Ilman succeeded in 1823 in volatilizing and sing carbon. The perfection of these forms of apparatus was acknowledged by Faraday in 1835, who, after various attempts to introduce improvements, adopted them in preference to any forms he could devise. ("Experimental Researches," 1124, 1132.) It was with these batteries that the first application of voltaic electricity to blasting under water was made. This was in 1831, and the experiments were made under the direction of Dr. Hare. (See **BLASTING**.) Numerous papers were contributed by Dr. Hare to the scientific journals, and especially to the "American Journal of Science." The catalogue of these in the index (being the 50th volume of the first series of the work) occupies nearly 5 columns, and many more papers are found in the succeeding volumes of the 2d series. A considerable portion are controversial, and stamp the author as a strong, original thinker, and a combatant by no means easy to vanquish. In the earliest volumes of this journal he established his claims as the original discoverer of the oxyhydrogen blowpipe, and presented descriptions of his galvanic batteries. In later volumes of the same work are his letters addressed to Berzelius, Liebig, Faraday, and others; and those for the year 1842 contain his discussion with Mr. William C. Redfield, in which he contested the theory of the rotary motion of whirlwinds and storms, ascribing their origin to electrical causes. In vol. i. of the 2d series (1846) are two papers in which he "attempts to refute the reasoning of Liebig in favor of the salt-radical theory."—The attention of Dr. Hare was not exclusively directed to scientific subjects. He sometimes entered with interest into the discussion of important political and financial questions, and occasionally indulged in poetical composition. He was a frequent speaker at meetings of scientific men; and in conversation, especially when it assumed an argumentative character, he discoursed with great ability, commanding attention. His external features were in harmony with the strength and massiveness of his intellectual qualities. His frame was powerful and remarkable for its muscular development, and his head was large and finely formed. During the last few years of his life, while most of his faculties retained their original vigor, others, either through the effects of age or long continued application, appear to have been somewhat weakened. In this condition he was induced to attend one of the exhibitions of what is called a medium, and having received, as he thought, correct replies to questions of which no one knew the answers but himself, he became a believer in spiritual manifestations, and, with his characteristic fearlessness in advocating what he considered to be truth, he lectured and published on the subject. In domestic life Dr. Hare was noted for his kindness and amiability, though often abstracted and abrupt in manner. He was a firm friend, of strict integrity, a lover of his race and of his country.—Beside his papers com-

municated to scientific journals, Dr. Hare published in 1810 a treatise entitled "Brief View of the Policy and Resources of the United States;" in 1836, a work on "Chemical Apparatus and Manipulations;" a revised edition of Henry's "Elements of Experimental Chemistry," in 2 vols.; and also, "Compendium of the Course of Chemical Instruction in the Medical Department of the University of Pennsylvania."

**HARE LIP**, a congenital fissure of the upper lip, on one or on both sides, giving to the mouth very much the appearance presented by the cleft upper lip of the hare. It is sometimes accompanied by a fissure of the hard and soft palate in which the cavities of the mouth and nose communicate; when the teeth and the gums project through the fissure, the deformity is much increased. In the infant it interferes with the process of sucking, and in the adult renders speech imperfect; when fissure of the palate coexists, not only is articulation indistinct and nasal, but the passage of food and drink from the mouth to the nose, and of the nasal secretions into the mouth, is a source of great annoyance and mortification. This deformity is in most cases capable of removal by a very simple surgical operation, which has been practised successfully upon infants a few weeks old. The operation consists merely in paring the edges of the fissure with a knife or scissors, and keeping the cut surfaces in apposition by needles and sutures, strengthened by sticking plaster or collodion. When the hare lip is double, both sides are generally operated on at the same time. It is usual to extract projecting teeth, or to remove any too prominent portion of the jaw by cutting forceps. Bleeding is generally slight, and restrained by pressure or simple contact of the cut surfaces. In infants, adhesive straps are often necessary to prevent the edges being drawn asunder by crying or sucking; in adults, strict silence and liquid food are enjoined for 4 or 5 days. Fissure of the soft palate is remedied on the same principle of paring the edges and keeping them in contact by various kinds of sutures and needles; this operation, called *staphyloraphy*, can only be performed on a patient old enough to aid the proceedings of the surgeon. It is attributed to intra-uterine disease, producing an arrest of development; when single, it is said to be most common on the left side.

**HAREM**, or **EL HAREEM**, an Arabic word signifying a sanctuary. It is applied to the holy cities, Mecca and Medina, which are jointly called "the harems," and to the temple of Mecca, which is termed *Masjid-el-hareem*, the sacred mosque. In its more general use it signifies throughout the Mohammedan world the female members of a family, and also that part of a dwelling house which is appropriated to their use. In the literature of Christendom the word is usually employed to designate only the female household of a Mohammedan of rank or wealth who has a number of wives and concubines.

But this is too limited a use of the term, which, in all the countries where Mohammedanism prevails, is applied equally to the domestic establishment which consists of a single wife and to that which contains several. It is even commonly used by the Greeks, Armenians, and Jews of the Turkish empire, though their practice with regard to the seclusion of women is not so strict as that of the Mohammedans. That practice is founded on customs of remote antiquity in the East, but its prevalence among the Mohammedans has been established by the following passage of the Koran: "And speak unto the believing women, that they restrain their eyes, and preserve their modesty, and discover not their ornaments, except what necessarily appeareth thereof; and let them throw their veils over their bosoms, and not show their ornaments, unless to their husbands, or their fathers, or their husbands' fathers, or their sons, or their husbands' sons, or their brothers, or their brothers' sons, or their sisters' sons, or their women, or unto such men as attend them and have no need of women [eunuchs], or unto children." The feeling of the sacredness of women, and of the propriety of secluding them as far as possible from contact with the other sex, is so strong among the Mohammedans that men are even prohibited from entering the tombs of some females, as for instance the tombs of the wives of Mohammed at Medina, into which women are freely admitted. A man and woman are never buried in the same vault, unless a wall separate the bodies. In most Mohammedan countries the houses, except those of the poorest peasantry, have an apartment, or a suite of apartments, for the reception of male visitors, who, unless near relatives, never penetrate beyond them. The apartments of the women—the harem—are generally in the upper stories, and so contrived as to secure the utmost privacy. They have commonly a separate entrance, and care is taken to place the windows so that they shall not be seen from the windows of any other house. They are also protected from observation by wooden blinds. In a harem containing several wives, it is usual to assign to each separate suites of apartments, each suite comprising a kitchen and other conveniences. In some places, as in Damascus and other cities of Syria, the harem is often superbly furnished and decorated, while the more public part of the dwelling exhibits every sign of poverty. In the harem of a large house there is generally a bath. Lady Mary Wortley Montagu, who travelled in Turkey in the early part of the 18th century, describes a harem at Adrianople as containing winter apartments wainscotted with inlaid work of mother-of-pearl, ivory of different colors, and olive wood, and summer apartments the walls of which were all crusted with porcelain, the ceilings gilt, and the floors spread with the finest Persian carpets. The inmates of the harem may lawfully consist of a wife or wives to the number of 4, and of any number of female slaves

some of whom, however, are often kept merely as servants to cook, to clean the rooms, and to wait upon the wives and concubines. It is estimated, however, by the best informed travellers, that only one man in 20 has more than one wife. It is only the very rich that maintain populous harems, and many of the rich are content with one wife, or from affection or fear of trouble do not take a second. In frequent instances the wife who will not tolerate a second spouse in the harem, will permit the husband to keep concubines for the sake of having them to wait upon her. It is said that the Mohammedan women do not dislike the degree of seclusion in which they are kept, but on the contrary take a pride in it as an evidence of their value. If the husband relaxes his vigilance, and permits them to be freely seen by other men, they regard his liberality as indicative only of indifference to their charms.—The Christian travellers most familiar with oriental life have passed very opposite judgments on the nature and effect of the harem system. Lady Mary Montagu, who visited the harems of the great officers of the empire, has left gorgeous and romantic pictures of what she saw. These harems she describes as glittering with splendor and inhabited by lovely girls magnificently attired, leading a gay and happy life. Miss Harriet Martineau, who visited some harems of the higher class in Cairo and Damascus in 1847, gives a very different picture of the institution. In a harem at Cairo she found above 20 women, some slaves, most or all young, some good-looking, but none handsome. Some were black, Nubians or Abyssinians, and the rest Circassians with very light complexions. They pitied the European women heartily, because they had no one to take care of them, and seemed to think them strangely neglected in being left so free. She saw no trace of intellect in these women, except in one homely old lady. All the younger ones she characterizes as dull, soulless, brutish, or peevish. Their ignorance she describes as fearful, and their grossness as revolting. At Damascus she saw the 7 wives of 8 gentlemen in one harem, with a crowd of attendants. Of the 7, 2 had been the wives of the head of the household, who was dead; 3 were the wives of his eldest son, aged 22; and the remaining 2 were the wives of his second son, aged 15. The pair of widows were elderly women, as merry as girls. Of the 5 others, 3 were sisters, children of different mothers in the same harem. They smoked and drank coffee and sherbet, and sang to the accompaniment of a tambourine, and danced in an indecent manner, and all the while romping, kissing, and screaming went on among the ladies, old and young. She pronounces them the most injured human beings and the most studiously depressed and corrupted women she has ever seen. Lady Shiel, wife of the British minister to Persia in 1849, who lived 4 years in that country, says that Persian women of the upper class lead a life of idleness and luxury.

and enjoy really more liberty than the women of Christendom. They consume their time by going to the bath and by a constant round of visits, and frequently acquire a knowledge of reading and writing, and of the choice poetical works in their native language. Cooking, or at least its superintendence, is a favorite pastime. Women of sense frequently acquire so much influence over their husbands as to get almost entire control of the property and affairs of the family. On the other hand, a great deal of cruelty, and even murder, may be committed in the harem with impunity, and terrible tragedies prompted by jealousy are often enacted within its recesses. In populous harems the mortality among children is very great, owing to the neglect, laziness, and ignorance of the mothers and nurses. Opium in large quantities is freely used to quiet them, and weak and delicate children seldom reach adult age. An American lady, Mrs. Caroline Paine, who recently travelled in the Turkish empire, states in her "Tent and Harem" (New York, 1859) that she made the acquaintance of Turkish women, "who were, and ever will be, to my mind, wonderful instances of native elegance, refinement, and aptness in the courtesies, ordinary civilities, and prattle of society." She says: "Turkish women are by no means confined to a life of solitude or imprisonment, and they would be scarcely tempted to exchange the perfect freedom and exemption from the austere duties of life, which is their acme of happiness, for all the advantages that might be gained from intellectual pursuits or a different form of society. They roam in parties when they please and where they please, if it be not far from home, accompanied by slaves and various attendants. Their highest enjoyment is in passing the bright sunny days of their long summers under the broad-spreading plane trees that are to be found beside every stream." At Broussa Mrs. Paine visited the harem of the governor: "The pasha had but one wife, and we were received by her with the ease and dignity of manner usual in a person accustomed to refined society. She seated us upon the centre of a divan, that being the place of honor, and occupied one end of it herself. She was extremely affable and communicative, asking many questions, and making many pertinent remarks, in a spirit of genuine politeness and good nature. She wondered much at the courage we had shown in coming so far from our homes; thought it was perfectly proper for Frank women to travel anywhere, but that the Turks ought to remain at home, where they were far more contented than they could be elsewhere. She spoke freely of the difference in our manners and customs, and although she had too much politeness to draw a contrast in favor of their own, it was plain enough what her thoughts were. She was certainly far from handsome, and past the middle age of life, yet she had a sweetness of expression and an irresistible grace of manner that quite won us." Capt. Burton, who has travel-

led largely in Mohammedan countries in the disguise of a native, and who in the quality of a physician has seen something of the interior of the harem, says that it very much resembles a European home composed of a man, his wife, and his mother; and that, as far as his observations go, the oriental is "the only state of society in which jealousy and quarrels about the sex are the exception and not the rule of life."

HARFORD, a N. E. co. of Md., bounded N. E. by the Susquehanna river, and S. E. by Chesapeake bay; area, 480 sq. m.; pop. in 1850, 19,356, of whom 2,166 were slaves. The N. W. part is hilly, and contains limestone, granite, and iron. The surface near the bay is level. The soil is fertilized by the use of lime and guano. The productions in 1850 were 516,587 bushels of Indian corn, 186,421 of wheat, 220,012 of oats, 56,470 of potatoes, 12,887 tons of hay, and 21,072 lbs. of wool. There were 12 grist mills, 2 saw mills, 4 furnaces, 2 forges, 8 woollen factories, 1 paper mill, 3 newspaper offices, 38 churches, and 657 pupils attending public schools. The county is crossed by the tide-water canal and Philadelphia and Baltimore railroad. It was organized in 1778. Capital, Bel Air.

HARGRAVES, EDMUND HAMMOND, the discoverer of the gold fields of Australia, born about 1816 at Gosport, England, where his father was a lieutenant in the Sussex militia. At the age of 14 he went to sea on board a merchant ship, and during the succeeding 8 years visited almost every part of the world as a sailor. In 1834 he settled in Australia, where he married, and engaged in farming and stock raising. In 1849 he went to California, where he worked in the gold diggings, and was struck with the similarity between the geological structure of California and that of Australia. He wrote from San Francisco, March 5, 1850, to a merchant in Sydney, a letter containing the following passage: "I am very forcibly impressed that I have been in a gold region in New South Wales, within 300 miles of Sydney; but, unless you know how to find it, you might live for a century in the region and know nothing of its existence." In Jan. 1851, he returned to Australia, and on Feb. 5 set out from Sydney on horseback to cross the Blue mountains and explore for gold on the Macquarie river and its tributaries. His first trial of washing earth in this region produced a little piece of gold. He then washed 4 more panfuls of earth, all of which contained gold. By personal investigation he satisfied himself that for 70 miles along the Macquarie gold was to be found. Having concluded his investigations, Mr. Hargraves, April 8, 1851, addressed a letter to the colonial secretary, in which he said that if the government would award him £500 as a compensation, he would point out localities where gold was to be found, and leave it to the generosity of the government to make him an additional reward com-

mensurate with the public benefit that might result from the discovery. The colonial secretary replied that the government would pay nothing in advance, but would make him a suitable reward if the discovery proved to be of importance. This answer satisfied Mr. Hargraves, and on April 30 he wrote naming various places in the district of Bathurst where gold might be found. Within the year following this disclosure gold was exported from New South Wales and Victoria to the amount of nearly \$20,000,000. Mr. Hargraves was appointed commissioner of crown lands; the legislative council of New South Wales voted him £10,000; a gold cup worth £500 was presented to him at a public dinner, at which the governor-general was present, and various other public and private rewards were given him. In 1854 he returned to England, where he published in the same year a volume entitled "Australia and its Gold Fields."

HÄRING, GEORG WILHELM HEINRICH, better known under his pseudonym of WILIBALD ALEXIS, a German novelist, born in Breslau in 1798, where his father was director of the chancellery. After having received a scientific education at Berlin, he served in the campaign of 1815 and in several others as a volunteer, subsequently studied jurisprudence and political sciences, and held for a short time an office which he relinquished to devote himself to literary pursuits. Having gained a high reputation in his own country by the publication of several historical novels, he became known abroad by writing a romance entitled *Walladmor*, in compliance with a wager which he made with one of his friends to produce an imitation of Walter Scott's works. De Quincey undertook to translate this romance into English, but his version, though published with the title of "Walladmor" (London, 1824), was so much modified as to be nearly an original work. Among the best of Häring's other works in imitation of the great British romancer is his *Schlöss Aevalon* (Leipzig, 1827). He has written several interesting books of travel, and been engaged in various branches of literature, but most successfully as a writer of historical novels. The best of them are: *Cabanis* (6 vols., Berlin, 1832), containing a military song which has been set to music and become very popular; *Roland von Berlin* (8 vols., Leipzig, 1840); *Der falsche Waldemar* (8 vols., Berlin, 1842); *Die Hosen des Herrn von Bredow* (2 vols., 1846-'8); *Ruhe ist die erste Bürgerpflicht* (5 vols., 1852); *Isengrimm* (1854); *Dorothee* (1856). In concert with Hitzig he has prepared a large collection of historical sketches of criminal cases (22 vols., 1842-'54), under the title of *Der neue Pitaval*. Börne wrote against him his well known *Häringssalat*.

HARINGTON, SIR JOHN, an English poet, born in Kelston, near Bath, in 1561, died in London in 1612. His mother was an illegitimate daughter of Henry VIII., his father an officer of the court, and Queen Elizabeth was his godmo-

ther. He was educated at Cambridge. In 1591 he published a translation of Ariosto's "Orlando Furioso," which gained him a considerable reputation. Though both spiritless and incorrect, and much inferior to the later version of Fairfax, it had the effect of introducing new romantic and chivalric stories and machinery into the literature. In 1599 he accompanied the earl of Essex to Ireland, and attended Essex also in his precipitate return to England. This so enraged Elizabeth that she threatened to have him committed to the Fleet. After the accession of James I., he became a great favorite with Prince Henry. He wrote a satiric poem called the "Metamorphosis of Ajax" (1596), after the manner of Rabelais, in which he embellished a trivial subject with a vast store of learning, wit, and humor. The author was refused a license to print it, and was punished for its publication by exclusion from the court. In the same year he published an "Apologie" for the "Metamorphosis." "The Englishman's Doctor, or the Schoole of Salerne," a poem, appeared in 1608 or 1609. A collection of his "Most Elegant and Wittie Epigrams," interesting more for notices of contemporary characters than for literary merit, was appended to an edition of his "Orlando Furioso" in 1633; and a miscellany of original papers in prose and verse by Harington and others of his time, under the title of *Nugæ Antiquæ*, was edited by Thomas Park (2 vols. 8vo., London, 1804).

HARIRI, ABU MOHAMMED KASEM BEN ALI, the most brilliant and popular of Arabian poets, born in Bassorah about 1054, died there in 1121 or 1122. He was the descendant of a distinguished family, several members of which were conspicuous in the wars which preceded and followed the career of Mohammed. The name Hariri, which in Arabic signifies a "dealer in silk," was believed by some to have reference to a place, but is now generally supposed to refer to the occupation of the poet or one of his ancestors. The wealth of his family, and the splendid educational institutions of his native city, afforded Hariri a liberal education. When he was still young the district of Bassorah, together with the neighboring countries, became a dependent principality of the Seljooks, a conquering Turanian tribe. The spiritual authority of the caliph of Bagdad was still acknowledged, but the military and civil rule was in the hands of a petty sultan. Under this administration Hariri held a political office, having the title of *sahab-al-khabar* (news officer). He had passed the age of 50 when an invasion from the West again changed the face of the region between the Tigris and the Mediterranean. Syria and a part of Mesopotamia were conquered by the Christians of the first crusade, and an incident of this expedition is said to have inspired Hariri with the idea of writing the *Makamat* (plural of *makama*, resting place, assembly), which immortalizes his name. A detachment of crusaders belonging to the army of Baldwin surprised the town of Seraj, pillaged and burned

, massacring the men and carrying away the women. But few escaped. Of these was Abu Seid, who appeared in rags before Hariri and his friends, and made a deep impression upon the poet by the elegance of his recital. This man served as a model for the character of the hero of the *Makamat*, who received his name, Abu Seid of Seraj, while the poet seems to have painted himself in the person of the narrator, Iareth ben Hammam (the man of work and care). Abu Seid, who appears under continually new and surprising aspects in the 50 tableaux or novelettes of the poem, is a scholar and poet, of inexhaustible wit, humor, and fancy, eager to enjoy life as it passes, careless of the restrictions of custom, and still less ashamed of his poverty. Upon this poem Hariri bestowed all the colors of a glowing oriental fancy, the brilliancy of Arabian wit and philosophy, and the charms of diction and harmonious versification. But his boldness sometimes becomes extravagance, his wit overleaps the limits of taste, and his niceties are often perplexing. The Arabs regard the *Makamat* as the great treasury of their language, in which all its roots, forms, and beauties are stored up. He who has mastered this work is a perfect linguistic and poetical scholar. Numerous commentaries on it have been written. Hariri was accused of having plagiarized from an African, or, as others said, a Spanish poet. Another accusation was that of not strictly observing the rules of decorum and morality in his poetry, against which he defends himself by asserting that it was his intention to show and correct, but not to increase frivolity. Having consecrated his last *Makama* to the glorification of his native city, and to the recollections of his youth, he finally makes his Abu Seid, now grown old, vow repentance and devotion to the cares of eternity. He continued, however, to revise and correct his work till his death. Hariri is also the author of numerous grammatical works, of which the *Molhat-al-Irab* is a versified essay on the syntax of the Arabian language. Of this, as well as of *Dorrat-al-Gawas*, on idioms, fragments are contained in Sylvestre de Sacy's *Anthologie grammaticale Arabe*. The annals of his nation have preserved the names of three of his sons, all of whom filled judicial or administrative offices. Single *Makamas* of Hariri have been translated into occidental languages by Golius, Albert Schultens, Reiske, Rosenmüller, Jahn, Sylvestre de Sacy, Munk, Theodore Preston, and others. The work of the last mentioned translator, containing 20 *Makamas* in English, appeared in London in 1850. A complete Latin translation has been published by Peiper (2d ed., Leipzig, 1886). But neither of these equals the admirable German translation of the *Makamat* by Friedrich Rückert, entitled *Die Verwandlungen des Abu Seid von Serug, oder die Makamen des Hariri, in freien Nachbildungen*, which is perhaps the most masterly reproduction of a great foreign poet ever executed. One of the best editions of the original is that of Sylvestre de

Sacy (Paris, 1821-'2), with a commentary mostly collected from Arabian writers; others have been published at Calcutta (3 vols., 1809-'14), at Cairo, with notes (1850), and by Reinaud and Dernburg (Derenbourg) in Paris (2 vols., 1847-'53). Partial editions with notes are very numerous.

**HARLAN**, a S. E. co. of Ky., bordering on Va. and Tenn., watered by Cumberland river and its head streams, and bounded S. E. by Cumberland mountain; area, 666 sq. m.; pop. in 1850, 4,268, of whom 123 were slaves. It has a rugged surface, elevated 1,000 feet above the sea, and is rich in coal, iron, and timber. The productions in 1850 were 181,018 bushels of Indian corn, 21,065 of oats, 8,136 lbs. of tobacco, and 9,051 of wool. There were 86 grist mills, 1 saw mill, 8 churches, and 880 pupils attending public schools. Value of real estate in 1855, \$896,568. The county was formed in 1819, and named in honor of Maj. Silas Harlan, killed in the battle of Blue Licks. Capital, Mount Pleasant.

**HARLEM**. See **HAARLEM**.

**HARLEQUIN** (Ital. *arlechino*; Fr. *arlequin*), a pantomimic character, transplanted from the Italian stage to other countries, traceable to the earliest times, and more immediately identified with the ancient Roman mimes, who appeared before the public with their heads shaved, a sooty face, unshod feet, and a coat of many colors. The Italian harlequin presented about the same appearance, except that his face, instead of being painted with soot, was covered with a black mask, which made Marmontel think that he must have had a negro for his prototype. He also carried a light sword of lath, and his hat was in a deplorable condition. Goldoni considered the harlequin as a poor devil and dolt. The general term of zany (It. *zanni*), which includes most sorts of harlequins, is derived from the Latin *sannio*, a buffoon, of whose perpetual trembling motion, ludicrous and flexible gestures and grimaces, there is a graphic description in Cicero's *De Oratore*. Conspicuous among the characters or masks of the Italian extemporized comedy, or *commedia dell'arte*, were the ancient heroes of pantomime, the two *zanni*. One of them was converted into the famous Harlequin, and the other into Scapino, both satirizing the roguery and drollery of the Bergamasks, who were proverbial for their intriguing knavery, while other characters were introduced who ridiculed the Venetians, Bolognese, and the rival inhabitants of other Italian cities. Harlequin generally figured as a servant of Pantalone, the comic representative of Venetian foibles, and as the lover of Colombina or the *arlechinetta*; while Scapino, always on the watch to further any wickedness, was in the service of the *dottore*, the loquacious pedant and the burlesque type of the academical pretensions of Bologna. The principal inventor of those pantomimes in which the harlequin was introduced was Ruzzante, who flourished about 1580; and many of the actors who represented

the harlequin were artists of distinction. The performance had two peculiar features: certain pleasantries of gesticulation, technically called *lazzi* or side play, and an extempore dialogue. The mimetic effect of this side play was so powerful, that when a number of these comedians under Riccoboni made their first appearance in Paris, they gained the sympathy of a French audience, unacquainted with the Italian language, solely by their gesticulations. Rich, in the 18th century, introduced Harlequin on the English stage, and performed the character under the feigned name of Lun; and Garrick, who once introduced a speaking harlequin, thus celebrates the mimic genius of Rich:

When Lun appear'd with matchless art and whim,  
He gave the power of speech to every limb;  
Though mask'd and mute, convey'd his quick intent,  
And told in frolic gestures what he meant.  
But now the motley coat and sword of wood  
Require a tongue to make them understood.

In France Harlequin was converted into a wit, and even into a moralist, and is the hero of Florian's compositions. "This imaginary being, invented by the Italians, and adopted by the French," says Goldoni, "has the exclusive right of uniting *naïveté* with  *finesse*; and no one ever surpassed Florian in the delineation of this amphibious character." The German Hanswurst was originally intended as a caricature of the Italian harlequin, but corresponded more particularly with the Italian Maccaroni, the French Jean Potage, the English Jack Pudding, and the Dutch Pickelherringe—all favorite characters with the lower classes of the population, and called after favorite national dishes. The German Hanswurst was as noted for his clumsiness as the Italian harlequin for his elasticity or the French for his wit, and the Spanish Gracioso for his drollery. Both Hanswurst and Harlequin were gourmards; but the difference between the German and Italian buffoon was, that the latter could eat a great deal without having a glutton-like appearance, while the former grew to Falstaffian dimensions. Gottschied in the middle of the 18th century drove the Hanswurst from the German stage, and the Harlequin of the Italian became under Goldoni's reforming hand an entirely new and delightful character. The harlequin in its original conception has almost ceased to possess a legitimate existence in comedy, and has returned, like the English clown or Jack Pudding, to the sphere of Christmas pantomimes and puppet shows.

HARLESS, GOTTLIEB CHRISTOPH ADOLPH, a Protestant theologian of Germany, born in Nuremberg, Nov. 21, 1806. He was graduated as licentiate of philosophy in 1828 and licentiate of theology in 1829 at Erlangen, and in 1833 he received an extraordinary, and in 1836 an ordinary professorship of theology at the same university, together with the office of academic preacher. His *Commentar über den Brief an die Epheßer* (1834) met with a very favorable reception. His *Christliche Ethik* (1840) is regarded as one of the most important works of German theology. As a deputy to the Bavarian

diet in 1842-'3 he distinguished himself by his opposition to the order which required all persons connected with the army to bow the knee to the sacramental host. The government consequently removed him from his professorship in March, 1845, and appointed him a councillor of the consistory of Baireuth. In the same year he was called to Leipsic as professor of theology, and in 1847 became also pastor of a church in that city. In 1850 he was appointed chief court preacher, councillor in the ministry of public worship, and vice-president of the consistory of Dresden, in which position he exerted a great influence on the Lutheran church of Saxony. In Nov. 1852, he was recalled to Bavaria, and appointed president of the Protestant consistory of Munich and member of the Bavarian state council. Harless is considered one of the leaders of the orthodox Lutheran school of Germany, and is a prominent pulpit orator. He has published 5 vols. of sermons under the title *Sonntagsweihe* (1848-'51). Among his other works are *Ueber die kritische Bearbeitung des Lebens Jesu von Strauss* (1836), and *Theologische Encyclopädie und Methodologie* (1837). From 1838 to 1849 he was editor of a theological monthly, the *Zeitschrift für Protestantismus und Kirche*.

HARLEY, ROBERT, earl of Oxford, a British statesman, born in London, Dec. 5, 1661, died May 21, 1724. He was of an old and influential Puritan family of Herefordshire, his father and grandfather having taken arms on the parliamentary side in the civil war, although they subsequently favored the restoration. After a studious and secluded youth, he made his first appearance in public life in 1688 as a supporter of the prince of Orange, in whose behalf he aided his father in raising a body of horse. He entered the first parliament which met after the revolution, and for a time acted with the most ultra section of the whigs. By slow and almost imperceptible degrees, however, he abandoned the traditional policy of his family, and from being an intolerant and vindictive whig became an equally intolerant high churchman and tory. By good management he gained the confidence of both dissenters and churchmen, who combined, in Feb. 1701, to elect him speaker of the house of commons. He was chosen to the same office in the two succeeding parliaments, but resigned it in 1704 upon being appointed secretary of state. His promotion was due, according to the account given by the duchess of Marlborough, to the exertions of Miss Abigail Hill, whom he subsequently assisted in becoming Mrs. Masham, and whose influence with Queen Anne was considerable. Godolphin, Marlborough, and the whigs, however, lost no opportunity of weakening Harley's power, and in this were favored by the accidental discovery that one of his clerks named Gregg was carrying on a secret correspondence with the French court. Although there was no evidence of the complicity of Harley in this matter, and Gregg signed a paper exculpating him, he became the object of so much popular odium, that the

queen, against her will, it is said, was constrained in 1708 to dismiss him. After an interval of 2½ years the whigs went out of office, and, thanks to the manoeuvres of Mrs. Masham and himself, he was appointed chancellor of the exchequer. The attempt of a French agent named Guiscard to assassinate him in March, 1711, caused a popular reaction in his favor; and upon his recovery from his wounds, which were slight, he received the congratulations of both houses of parliament. In the succeeding May he was created earl of Oxford and Mortimer, a knight of the garter, and lord high treasurer of Great Britain. He was now at the height of his power; the whole direction of affairs was in his hands; the Marlborough party was completely discomfited, while his own influence with the queen was constantly increasing; and to add to the éclat of his administration, the treaty of Utrecht was concluded in May, 1718. Soon after this the intrigues of Bolingbroke, his ministerial coadjutor and political associate, between whom and himself a secret jealousy had long been fomenting, began to undermine his position. Mrs. Masham, the royal favorite, to whom Harley in his pride of power had ceased to pay court, was induced to side against him; and on July 27, 1714, after a stormy session of the privy council, he received his dismissal from office. He was treated with marked coldness upon presenting himself at court on the accession of George I., and in Aug. 1715, was impeached by the house of commons for high treason and committed to the tower. He was attended thither by an immense multitude, crying: "High church and Oxford for ever!" After nearly 2 years' confinement he was brought to trial on his own petition, and the house of commons not appearing to prosecute their impeachment, he was acquitted. The researches of Sir James Mackintosh among the Stuart papers prove that at this very time Harley was carrying on a treasonable correspondence with the pretender James at Versailles. He thenceforth lived in retirement. Amid his many engrossing public duties, he never ceased to cultivate the love of books and study to which his youth had been devoted, and at his death left a library of printed books, pamphlets, and manuscripts of immense value. The manuscripts, amounting to nearly 8,000, and known as the Harleian collection of MSS., are now deposited in the British museum. These, however, as well as the books and pamphlets, the latter of which, it is said, numbered 400,000, were completed by Edward Harley, his son and successor. His own writings, consisting of a "Letter to Swift on Correcting and Improving the English Tongue," an "Essay on Public Credit," and a few other miscellaneous pamphlets, possess little merit. He was the intimate friend of some of the greatest wits and poets of the time, including Pope, Swift, Arbuthnot, Parnell, Prior, and Gay, and aspired himself to the character of a wit and poet, sending to his friends in that capacity verses which were frequently beneath

criticism. Notwithstanding the important official stations he occupied, and his intimate relations with literary men, he was naturally slow of intellect, an awkward speaker, and possessed, according to Macaulay, "that sort of industry and that sort of exactness which would have made him a respectable antiquary or king-at-arms." According to the same authority, his influence in parliament was altogether out of proportion to his abilities; and his erudition, his gravity, his avoidance of show, and a certain affectation of mystery and reserve which he could assume on occasions, must account for the position he occupied during his long career.

HARLINGEN, a seaport town of Holland, in the province of Friesland, on the North sea, 16 m. W. of Leeuwarden, with which it is connected by a canal; pop. about 9,000. It has an active trade, being the principal commercial town of Friesland, and manufactures sail cloth, gin, bricks, paper, salt, &c. The principal exports are cattle, butter, cheese, fruit, vegetables, flax, hemp, and wool; the chief imports are corn, timber, tar, pitch, coal, chalk, and earthenware. It is protected by one of the largest dikes in Holland, and contains a monument to the Spanish governor Roblas, who first introduced an improved method of constructing these sea walls.

HARLOW, GEORGE HENRY, an English painter, born in London in 1787, died there, Feb. 4, 1819. After studying under other masters, he entered the studio of Sir Thomas Lawrence, who used to employ him to dead color. Harlow had so large a share in painting the much admired lap dog of a fashionable lady, that he had the imprudence to claim the work as his own, and Sir Thomas dismissed him. In 1818 Harlow visited Rome, where he astonished the artists of that city by completing an effective copy of the "Transfiguration" of Raphael in 18 days. This performance gained him the friendship of Canova, who exhibited one of his pictures at his house, and procured his election as a member of the academy of St. Luke. His best original works are two designs from Shakespeare, "Hubert and Prince Arthur," and the "Trial of Queen Catharine." The principal characters in the latter are portraits of members of the Kemble family; and the figure of Queen Catharine is a likeness of Mrs. Siddons. He was also eminent as a portrait painter, and his portrait of Fuseli is regarded as a work of great merit.

HARMATTAN, a dry, hot wind, which blows in December, January, and February, along the coast of Africa, from Cape Verd and Cape Lopez toward the Atlantic ocean. It comes on at any time, and continues sometimes one or two and sometimes even 15 or 16 days, during which time it is accompanied by a fog which obscures the sun, rendering it of a mild red color. All vegetation is checked, young or tender plants are destroyed, and grass is turned to hay. It affects the human body also, making the eyes, nostrils, and lips dry, and at times causing the skin to parch and peel off. At the



same time, however, it checks epidemics, and cures persons afflicted with dysentery, fevers, or cutaneous diseases. The harmattan is the same wind as the *sirocco* of Italy and the *kamseen* of Egypt.

**HARMER, THOMAS**, an English dissenting minister, born in Norwich in 1715, died in Wottesfield, Suffolk, in 1788. He was educated in London, and in his 20th year was ordained minister of the Independent church in Wottesfield. He published in 1764 the first edition of his "Observations on Various Passages of Scripture," illustrating them by quotations from books of travel describing oriental manners and customs. An enlarged edition appeared in 2 vols. in 1776. The 5th and best edition was published under the editorial care of Dr. Adam Clarke (4 vols., London, 1816). The other works of Harmer are: "Outlines of a New Commentary on Solomon's Song, drawn by the Help of Instructions from the East" (London, 1768), and a volume of miscellaneous writings, edited by Youngman (London, 1823).

**HARMODIUS**. See **ARISTOGITON**.

**HARMONICA**, or **ARMONICA**, a musical instrument, in which the tone is produced by the vibration of bell-shaped glasses, caused by friction from the moistened finger. It was first contrived by Mr. Packeridge, an Irish gentleman, was improved by Mr. E. Delaval, a member of the royal society, and still further by Dr. Franklin, whose instrument had a compass of 8 octaves from G to g. The glasses, carefully tuned in semitones, were revolved by a pedal movement and touched by the tips of the fingers, occasionally moistened with water. Once tuned, it did not vary from the pitch, and the volume of tone was swelled or diminished by a greater or less pressure. The quality of the tone is exceedingly pure and sweet, but of such a penetrating character that it is painful to the ears of many sensitive persons. A somewhat similar application of glass vessels for musical instruments is described in the *Mathematische und philosophische Erquickungstunden*, published at Nuremberg as long ago as 1677; and a harp-sichord harmonica, in which a key action was substituted for finger pressure, was made by Röllig at Vienna, and by Klein at Presburg. In one made by Abbate Mazzuchi, the friction was produced by a hair bow; and Stein, the celebrated organ builder, invented a stringed harmonica, in which strings were used instead of glasses, with a kind of spinet attachment, the effect of which was thought remarkable. Still another modification was the substitution of steel pegs for the glasses. The construction of Franklin's harmonica is fully described by him in his letters. His enthusiasm evidently expected for the harmonica an extended use, which none of the forms of the instrument have ever attained; nor has it been regarded by musicians or composers as entitled to any higher rank than that of a musical curiosity or toy.

**HARMONISTS**, a religious body which originated in Germany, and was transplanted from

Warttemberg to the United States about 1800. They left their native country in consequence of the government's compelling their attendance at the parish church after some changes had been made in the form of worship of which they did not approve. Under the leadership of their pastor, George Rapp, they settled first on Conequenessing creek, in Butler co., Penn., where they founded the village of Harmony, and employed themselves in agriculture and manufactures. They acquired considerable wealth by the sale of their produce, and in 1815 removed to the territory of Indiana, where they had purchased a tract of 27,000 acres on the Wabash. The settlement of New Harmony which they made here was even more prosperous than their former establishment, but in 1824 they sold the property to Robert Owen the socialist, and emigrated to Beaver co., Penn., where the town of Economy was laid out on the right bank of the Ohio, 17 m. N. W. from Pittsburg. The Harmonists own here 3,500 acres of land, and their settlement consists of about 100 dwellings, a church, a school house, a museum, and several factories where they make broadcloths, flannels, carpets, silk handkerchiefs, cotton goods, &c. They rear silkworms, horses, cattle, sheep, and swine, and produce wheat, barley, rye, oats, flax, clover, garden fruits, and even some wine. All their goods are held in common. Novices are admitted to the society by vote after 6 months' trial, and persons who desire to leave are allowed to take with them the property which they brought into the community, but without interest or share of the profits. Offences are punished by reprimands, temporary exclusion from the church and social intercourse, and expulsion. Members of both sexes are admitted, but they do not marry. The Harmonists profess the Protestant religion and universal toleration. They keep watch by turns at night, observe strict morality, and reverence the Sabbath. They cultivate the learned languages, liberal professions, and music. In 1832 over 200 members seceded from the society. George Rapp, the founder, died in 1847.

**HARMONY** (Gr. *ἀρμονία*, agreement or concord), a term now used to signify an agreement between two or more sounds heard simultaneously, or the blending of sounds which together produce an agreeable impression. It is probable that the Greek use of the word implied the fitness of successive sounds, now distinguished as melody; but they employed some simple chords, and must have understood in a degree the subject of concord proper. Sounds are divided into noises, or irregular sounds, which, as experimentally shown, are due to unequal and confused vibrations, and musical sounds, or tones, which are regular, and due to repetition of sensibly equal vibrations. Thus, Savart's revolving iron bar, made to pass near the edge of a piece of card, produced when turned slowly a noise or concussion at each passage of the bar; but these con-

cussions, when increased to 7 or 8 per second, making from 14 to 16 simple vibrations, blended into a musical sound, the lowest audible; a toothed wheel striking a similar card yielded the highest audible sound at 48,000 simple vibrations per second, and above this the sounds were inaudible to ordinary human ears; the compass being thus about 11 octaves. It is possible there are insects which produce and hear tones still more acute than the highest above given. Tones differ in pitch, being high or low; in force, being loud or soft; in length, being long or short; and in *timbre*, or quality, as in the peculiarity of tone characterizing a flute, harp, or other instrument, or an individual voice. Melody is evidently a creation and perception of mind; and every tune or other composition is a musical idea, requiring for its embodiment a certain succession of sounds. This department of music therefore finds its explanation in psychological causes purely; but harmony is a result based in mathematical relations of the vibrations giving rise to different tones. Whatever their *timbre* or force, sounds are in unison when they are produced by vibrations that are executed in equal times. The passage from a low tone to a higher, in music, is not by a continuous elevation; but between any two tones recognized as properly successive by the mind there is a constant difference, termed their interval. Musical instruments are contrivances for giving out sounds differing by such intervals. In stringed instruments, the number of vibrations per second of any string is in the direct ratio of the square root of the force of tension, and in the inverse ratio of the product of the length, diameter, and square root of density. Thus, other things being equal, when the tensions are as 9 to 4, the vibrations are as 3 to 2; or, when the lengths are as 2 to 1, the vibrations are as 1 to 2. The tone always rises in the ratio of the vibrations. By experiments with the sonometer and the toothed wheel, or the siren, the number of simple vibrations required to produce any tone is found. These have been progressively increased during the present century, sharpening all the notes a full tone, until the ordinary C of the base had come to correspond to 264 simple vibrations, instead of 256, as commonly stated. The commission recently charged with establishing throughout France a uniform or normal diapason have slightly lowered this, so that the A' shall correspond to 870, and of course C to 261 simple vibrations. The relative numbers of vibrations required to give the octave from C to C' are as 1,  $\frac{2}{3}$ ,  $\frac{4}{3}$ ,  $\frac{3}{2}$ ,  $\frac{5}{3}$ ,  $\frac{3}{2}$ ,  $\frac{1}{2}$ , 2; the double of the number found for any note gives its octave; the quadruple of such number, a second octave above; and so on. Bernoulli has shown that the fundamental sound of an open tube, as in the organ, has a wave length just equal to the length of the tube itself; hence the lowest base sound audible will require, on the ordinary standard, a tube about 85 feet in length. By blowing forcibly into such a tube,

the octave of the fundamental note will be sounded; still more forcibly, the twelfth. In open tubes, as in strings, the lengths must diminish in the same ratio as the number of vibrations is to be increased, the half length giving an octave, and so on. The same law holds for tubes closed at one end; but in these the fundamental note is always an octave lower for the same length. Mersenne first asserted that concord has a physical cause, found in a certain ratio between the vibrations producing accordant sounds, in consequence of which simple pulses of the sound in each coincide at regular and close intervals; and Euler illustrated this by rows of equidistant dots representing the pulses for the several tones, and showing how often in any two they would come together. Thus, if two voices or instruments yield the same note, the pulses are equal in interval or distance, and strike the ear continuously together; this is the most perfect accord, and the result is simply a strengthening of the tone. The next chord in degree of perfection is the octave, in which, with every pulse of the lower tone, every 2d pulse of the higher corresponds; then, in order, the fifth, or C to G, in which every 3d pulse of the higher coincides with every 2d of the lower; the fourth, C to F, marked by a coincidence of the 4th and 8d waves respectively; the major third, C to E, by coincidence of the 5th and 4th pulses; and the minor third, E to G, to that of the 6th and 5th pulses in the two tones. What are termed chords in music usually involve 8 related tones. The perfect chord, or harmonic triad, of any note, consists of the note itself, its major third and perfect fifth. This, C E G, has two inversions, G C E and E G C. When its third is flattened, this gives the perfect minor chord, with corresponding inversions. All these chords are consonant; others, as that of the seventh, dissonant. In the use of the former in music consists natural harmony; but a certain mixture of concords and discords, bearing relation to the harmonic triad of the fundamental note, may be made to constitute what is termed artificial harmony. Perfect as is the mathematical theory of concord, the perfection of our enjoyment of music still depends on two quite extraneous and accidental circumstances; one of which, strange to say, is a natural imperfection in the acuteness of the sense of hearing. 1. Though musical performers be at various and irregular distances from the hearer, as 3, 5, 6, and 8 feet, or other distances not differing by wave lengths of the sounds they produce, still these waves, instead of clashing, as might be expected, compel each other into coincidence; and all the sounds, as well as their accord, reach the ear complete. 2. While all the octaves of the fundamental note in the natural scale are perfect, yet, owing to inequality of the intervals, the octaves of some of the other notes, as E, are not perfect, and, taken with mathematical exactness, would be perceptibly dissonant. The imperfection of the ear, however,

which cannot discriminate two sounds, separately made, when they become almost identical in pitch, allows this difficulty to be remedied by distributing the variation of any note other than the fundamental among the 12 semitones of the octave, in such a way that any one of these can be used as a key note, without shock to the musical sense. This is called the temperament of the scale; it may be equal, when the discordant interval is equally divided between the other notes; or unequal, when some keys are favored at the expense of others. Harmony, thus modified by temperament, forms the basis of tuning, which in the piano may be done by the ear; but in the organ, where, on account of the duration of the notes, discords more readily appear, and less liberty of temperament can be allowed, it is performed by the aid of beats. In practice, no two notes have their interval exact, save the *C* and its octaves; but all of them are kept nearer to their required tone than any one could be if the intervals of the rest were made absolutely correct. The interval from the false octave obtained by the fifth to the true one has been termed the "wolf" in the strings; though by some this name is given to the bad fifth in the worst key, when some keys are favored at the expense of others. The tension of strings is diminished by heating and agitation, so that their tone is gradually flattened; but in wind instruments, heat, rarefying the included column of air, sharpens the tone. In a degree the pitch and quality of sounds of all instruments are affected by temperature and density of the air. From causes of this nature arises the necessity of frequently attuning the stringed instruments of an orchestra to whose whose tone is not equally at command. —HARMONICS are those accords of a note of which the number of vibrations are to those of the note in the ratios 1, 2, 3, 4, 5, and so on. Mersenne noticed that a string set to vibrate yields not only its fundamental note, but also its octave and 12th; and later observers have detected the 17th and 19th. By hanging bits of paper on a vibrating string, it was found that there were nodes or points of rest at which the string divided itself into segments; so that, as Sauveur showed in 1700, the string not only vibrates as a whole, but also at the same time in halves, thirds, fourths, &c. From such division the accords first named must result, called harmonics, or acute harmonics. The columns of air in tubes vibrate in segments in like manner; these, when the tube is open, are the same as for strings; when closed at one end, as 1, 3, 5, &c. The mechanical explanation of the case was given by D. Bernoulli (1755), on the principle of the co-existence of small vibrations; according to which each vibration has its own and proper effect upon the ear, however at the same time the moving particles may be taking part in other vibrations. This is the explanation of the pleasing harmonics of the *Æolian* harp. In stringed instruments, the player may secure their production by lightly touching the

string at some nodal point; and the secret of Paganini's power lay largely in the use of harmonics. Theoretically, the series of harmonics is infinite, proceeding by less and less intervals; and since every note is identical with its octave, every harmonic has some corresponding note in every octave. But in practice, the number of these secondary notes that are producible, or that are pleasing, is limited. In wind instruments, by varying the stress of the breath, they are brought out successively, not together. A short pipe gives few harmonics; the common flute may give *C*, *C'*, *C''*, and *C'''*, and some have, it is said, brought out *D'''* and *E'''*. The bugle usually rises to *G''* only. Of course, the notes producible by an instrument consisting of a single tube, without stops, such as the bugle, French horn, trumpet, Pandean pipe, and (but for its slide) the trombone, must be made up of harmonic tones only. When two notes are very nearly of the same pitch, as when one has 100 and the other 101 vibrations per second, it is evident that during the first half of this period the second will have gained on the first until, at the end of the 50th vibration of the first, the second will be just half a vibration in advance; while at the end of the whole period they will coincide again. At the middle of every such period, then, the two vibrations will correspond in the phases of crest and trough, and so interfere, producing almost complete silence (complete, if the persistence of the impression on the auditory nerve did not partly bridge over this interval); while at the end of every such period the two sounds will reinforce each other, and result in a louder note. Between the two sets of points, the sound will continually swell and diminish, thus acquiring a peculiar pulsatory character, like that heard in two organ pipes, or strings, when brought nearly to unison. These new pulsations, first noticed by Sorge (1744), and by Tartini named *beats*, may become so rapid as to act like single vibrations, so that two sharp notes of very nearly the same pitch may actually constitute to the ear a new, low, and peculiar note; and this is termed a *grave harmonic*. When the two single sounds approach the ratio 2:3, their coincidences or beats will be of a frequency 1, and hence give an octave below the sound 2.

**HARMS, CLAUß**, a German theologian, born in Fahrstedt, Holstein, May 25, 1778, died in Kiel, Feb. 1, 1855. He was the son of a miller, and for some time followed his father's business. In 1799 he commenced the study of theology at Kiel, became deacon at Lunden in 1806, archdeacon in 1816, chief pastor of the church of St. Nicholas and provost at Kiel in 1835, and councillor of the supreme consistory in 1842. Having lost his sight, he resigned his office in 1849. He celebrated the jubilee of the reformation in 1817, by propounding 95 new theses, in which the doctrines of the total depravity of man and the indispensable necessity of faith were maintained in opposition to the rationalism of the age. Against him Baumgarten-Crusius wrote

the *XCV. Theses Theologicae contra Superstitionem et Profanationem*. The controversy thus arising renewed the contest between rationalism and supranaturalism. The theses and theological works of Harms gave the first strong impulse to a great revival of the orthodox Lutheran theology in Germany, and in his native province, Holstein, Lutheran orthodoxy soon regained an absolute sway. Harms published a number of sermons; a *Pastoral-Theologie* (3 vols., 2d ed. 1887); *Weisheit und Witz* (1850); *Selbstbiographie* (2d ed. 1851); *Vermischte Aufsätze und Kleine Schriften* (1858).

HARNETT, CORNELIUS, an American revolutionary statesman, born in England, April 20, 1723, died in North Carolina in 1781. He came in early life to America, and prior to the disputes with Great Britain was a man of wealth and distinction, residing on a large estate near Wilmington, N. C. He was one of the earliest to denounce the stamp act and kindred measures. In 1770-'71 he was representative of the borough of Wilmington in the provincial assembly, and chairman of the most important committees of that body. In 1772 he was appointed by the assembly, with Robert Howe and Maurice Moore, to prepare a remonstrance against the appointment, by the royal governor Martin, of commissioners to fix the southern boundary of the province. Josiah Quincy, who visited him in the following year, called him "the Samuel Adams of North Carolina;" and, as the revolution approached, he was its master spirit throughout the Cape Fear region. He was elected to the provincial congress in 1775, and to the congress at Halifax, on the Roanoke, in 1776, and drew up the instructions to the North Carolina delegates in the continental congress. When in 1776 Sir Henry Clinton appeared with a British fleet off Cape Fear, Harnett and Howe were excepted, as arch-rebels, from the terms of a general pardon. On the arrival of the declaration of independence at Halifax, July 26, 1776, Harnett read it to a great concourse of citizens and soldiers, who took him on their shoulders and bore him in triumph through the town. In the autumn he was on the committee for drafting a state constitution and bill of rights, and afterward as member of the continental congress he signed the articles of confederation. When in 1780-'81 the British held possession of the country around Cape Fear, Harnett was made a prisoner, and died while a captive.

HAROLD I., king of the Anglo-Saxons, sur-named HAREFOOT from his swiftness in running, died in 1040. He was the 2d of 3 sons of Canute the Great, who had expressed the wish to bestow his kingdoms of Norway, England, and Denmark severally upon his sons Svend, Harold, and Hardicanute. At the council which met at Oxford upon the death of Canute (1035), to elect a new sovereign for England, the chiefs of Danish descent preferred Harold; the Saxons preferred Hardicanute, because he was the son of the widow of their late king, Ethelred.

Harold, by force or powerful influence, got possession of London, and of the country north of the Thames; and Hardicanute, who claimed the west, and, by the marriage contract of his mother, ought to have succeeded to the crown (his brother being illegitimate), was soon after deposed, through the intrigues of Earl Godwin, upon the promise of Harold to espouse the daughter of that nobleman. Harold and Godwin meantime, in order to achieve their ends the more securely, conspired also to destroy the Saxon princes, Alfred and Edward, sons of Ethelred, and they were invited from their retreat in Normandy. Alfred was hurried to the isle of Ely, condemned to lose his eyes, and died of the wounds; but his brother, afterward Edward the Confessor, escaping the snare, regained his retreat in Normandy. Harold, having now seized the treasure of his father's widow, who escaped to Bruges, was soon master of all England. His reign was unmarked by other notable events. He was buried at Westminster; but his body, disinterred by order of his half brother Hardicanute, was cast into the Thames. It was recovered by a fisherman, and secreted in a Danish cemetery in London.

HAROLD II., king of the Anglo-Saxons, and the last king of that lineage, second son of Godwin, earl of Wessex, killed in battle Oct. 14, 1066. He was a leader in the armies of Edward the Confessor, and as such did good service in battle with the Welsh. About 1065 he was shipwrecked on the coast of Ponthieu and made prisoner by the earl Guy, who delivered him over to William of Normandy. William detained him until he had taken an oath to support the Norman's pretensions to the English crown after the death of Edward; but when that event took place (Jan. 5, 1066), he caused himself to be proclaimed by an assembly of the thanes and the citizens of London, and was crowned in London the next day. Edward, it is asserted by the Norman historians, had willed the succession to the duke of Normandy, but had been prevented from taking steps for the security of his testament. Harold claimed a similar testamentary right. Harold's brother Tostig, a man of great talent and activity, and filled with deadly hatred against his brother for fancied wrongs, appealed to Harold Hardrada of Norway, who promised to invade England. Tostig, however, impatiently collected a force in Flanders, after planning operations also with William, and ravaged the southern coasts. He was defeated afterward by the earls of Mercia and Northumbria, and retired to Scotland to await the arrival of his allies. William meanwhile sent an embassy to Harold, demanding the crown of England. The new king, strong in alliance with his powerful nobles, gave a disdainful reply, and prepared to receive the different invaders. His attention appears to have been directed chiefly to the side of Normandy; for the king of Norway, accompanied by Tostig, landed unopposed at Scarborough. They were met near York by

the northern earls, who were defeated, and, retreating to York, were besieged in that city. Four days later Harold arrived to their relief (Sept. 25, 1066), and a battle was fought in which the king of Norway and Tostig were killed. The Norwegian warriors, escaping to their ships, were suffered to withdraw unmolested from the coast. Three days after this decisive conflict (Sept. 28) the duke of Normandy landed unopposed at Bulverhithe, and advanced to Hastings. His force was 60,000 fighting men; and Harold marched to meet them with far inferior numbers. On Oct. 14 the famous battle of Hastings was fought, in which Harold lost his life, and William became king of England. (See **HASTINGS**.)

**HAROUN**, surnamed **AL RASHID** (the Just), 5th caliph of the dynasty of the Abbassides, and the most powerful monarch of his race, born in Rhey about A. D. 765, died in Thous, April 2, 809. He was the grandson of Abu Giaffar, surnamed **Al Mansoor**, and the son of the caliph **Mahdi** by the slave **Khaizeran**. In the reign of his father he led an army of 95,000 Persians and Arabs against the Byzantine empire, then ruled by Irene. He traversed Bithynia, defeated the Greek general **Nicetas**, penetrated to the Bosphorus (781), encamped on the heights of **Ohryspolis** or **Scoutari**, opposite Constantinople, and forced the empress to engage to pay an annual tribute of 70,000 dinars of gold, and to prepare the roads for his return to the Tigris. In 786 he succeeded his elder brother **Hadi**, who had vainly attempted to exclude him from the throne, and by his conquests and vigorous internal administration he raised the caliphate of Bagdad to its greatest splendor, and made his reign esteemed the golden era of the Mohammedan nations. His favorite ministers were **Yahia** and his son **Giaffar**, of the ancient Persian family of the **Barmecides**, whose ancestors had for many generations been hereditary priests at the fire temple of **Balkh**, and who now rapidly exalted the family to the highest dignities under the caliphate. While Haroun was occupied in fortifying the frontier provinces against the Greeks, **Musa** the **Barmecide** captured the chiefs of two hostile factions in Syria, brought them to Bagdad, and ended their dissensions; **Fadhl**, son of **Yahia**, conquered **Cabool** and pacified a rebellion in **Dallem**; and **Jafar** joined to the office of vizier that of governor of Syria and Egypt. The whole internal administration of the empire fell into the hands of the **Barmecides**. They adorned the court with luxury, patronized letters and science, gave festivals, and made a noble but prodigal use of the riches which they amassed. The reign of Haroun is chiefly sullied by the sudden disgrace which he inflicted on them in 803, bringing those from whose talents and services he had most profited to imprisonment or death. He had devastated the Byzantine territories as often as Irene had declined payment of the annual tribute; but when in 803 she was succeeded by **Nicephorus**, the latter wrote to Haroun demanding restitu-

tion of all the sums which the empress had paid him. The reply of the caliph bespoke his indignation: "In the name of the most merciful God, **Haroun al Rashid**, commander of the faithful to **Nicephorus**, the Roman dog. I have read thy letter, O thou son of an unbelieving mother. Thou shalt not hear, thou shalt behold, my reply." He immediately traversed and ravaged a part of Asia Minor, laid siege to **Heraclea**, brought **Nicephorus** to acknowledge himself a tributary, and retired triumphant to his favorite palace of **Racca**, on the **Euphrates**. The peace being violated in 806, he returned rapidly in the depth of winter, and at the head of 135,000 men defeated **Nicephorus** in **Phrygia**, in a battle in which the Greek emperor was 3 times wounded and 40,000 of his subjects were slain. Again the tribute was refused, and Haroun returned in 808 with 800,000 men, desolated Asia Minor beyond **Tyana** and **Ancyra**, demolished **Heraclea**, devastated the islands of **Rhodes**, **Cyprus**, and **Crete**, and imposed a humiliating treaty on **Nicephorus**, by which the coin of the tribute was to be marked with the image and superscription of Haroun and his 3 sons. The treaty was soon broken, and Haroun again returned, took **Sebaste**, and swore never again to make peace with so perfidious an enemy. The fall of Constantinople was perhaps prevented by a revolt which broke out in **Khorassan** demanding the presence of the caliph, and his death occurred while on his march thither. In his latter years he had corresponded with **Charlemagne**, to whom he sent by an embassy in 807 a tent, a clepsydra, an elephant, and the keys of the holy sepulchre. In his reign of 23 years he performed the pilgrimage to Mecca 9 times, always attended by a retinue of theologians, juriconsults, and poets. He cultivated poetry himself, favored wit and gayety at his court, protected many illustrious scholars and poets, as **Abu Moawiah**, **Abd al Mobarik**, **Ismail ben Mohammed**, and **Abu Nowas**, and is almost universally famous as the principal hero of the Arabian tales. He selected ministers who were his own rivals in ability, under whose wise administration prosperous towns sprang up throughout the empire, commerce flourished, and Bagdad was enlarged and adorned and made the centre of Arabic civilization and refinement.

**HARP** (Sax. *hearpa*, Germ. *Harfe*), a musical stringed instrument of a triangular shape, the chords of which are distended in parallel directions from the upper limb to one of the sides, and are set in vibration by the action of the thumb and fingers. Its origin cannot be satisfactorily ascertained; but it was familiar to the Hebrews in the time of **Moses**, and, as appears by the sculpture in a tomb near the pyramids of **Ghizeh**, was known to the Egyptians probably as early as 2000 B. C. The researches of recent travellers show that the Egyptians attained great perfection in the construction of the harp, which was frequently richly ornamented and of elegant form, having from 4 to 31 chords, and in the later specimens strikingly resembled

those in present use. In the Paris collection of Egyptian antiquities is a triangular harp of 21 chords, which, like all other Egyptian harps of which we have representations, has no pole or pillar to support the upper limb of the instrument. That the omission was intentional there seems no doubt; but it is difficult to conceive how in harps so constructed the tension of the strings could have been resisted. To the Greeks, who were indebted to Asia for their stringed instruments, the harp seems always to have been unknown, and the Romans probably had no knowledge of it in any shape analogous to its present form. It was common to the northern races of Europe in the early centuries of the Christian era, and in the opinion of many antiquaries was original among them. In Ireland and in Wales harps of many strings and of elegant form were in use as early as the 5th and 6th centuries, and so well known was it in the former country as to have become adopted as the national emblem. In Wales the harp is still cherished as the national instrument, and annual trials of skill in its use take place. The introduction of pedals, whereby it became possible to modulate into all keys, first gave the harp a higher position than that of an instrument of accompaniment, and the improvements of Sébastien Érard have made it capable of performing any music written for the pianoforte. His double action harp, perfected in 1808, has a compass of 6 octaves, from E to E, with all the semitones, and even quarter tones. Its form and tone have long made it a favorite instrument for the drawing room, notwithstanding the difficulty of executing upon it compositions in which there is much modulation. In the orchestra it is more sparingly used.

HARPER, JAMES, JOHN, JOSEPH WESLEY, and FLETCHER, the founders of the American publishing house of Harper and Brothers, born in Newtown, L. I., respectively in 1795, 1797, 1801, and 1804. Their father was a substantial farmer. At the age of 16, James and John were apprenticed to different printers in New York. Having earned a few hundred dollars by overwork during their apprenticeship, they established themselves in business, at first printing only books ordered by booksellers, performing the greater part of the composition and presswork with their own hands. They soon began to publish upon their own account, and in a few years were recognized as the leading publishing house in America. Wesley and Fletcher Harper had in the mean time been apprenticed to their elder brothers, and, as they became of age, were successively admitted as partners, and the style of the firm was changed from "J. and J. Harper" to "Harper and Brothers." In 1825 they established themselves at Nos. 81 and 82 Cliff street. In 1858 their establishment occupied 9 contiguous buildings, filled with costly machinery and books. On Dec. 10 of that year the whole was burned to the ground. Most of their stereotype plates were stored in vaults, and were saved; but the loss in buildings, ma-

chinery, and books amounted to \$1,000,000, upon which there was only \$250,000 insurance. The next day they hired temporary premises, and employed the principal printers and binders in New York, Boston, and Philadelphia in reproducing their books from the stereotype plates. Before the ruins could be cleared away the plans for their new edifice were prepared. It covers about half an acre of ground, extending from Cliff street to Franklin square in Pearl street, and, including cellars, the structure is 7 stories high. The principal front is of iron; the columns, beams, and girders in the interior are all of iron, the floors being of brick and cement. The buildings, which are absolutely fire-proof, are heated by steam pipes supplied from the engine which furnishes the motive power. They have now in operation 42 Adams presses, used for book-work, and 8 cylinder presses. In the establishment are permanently employed about 600 persons, of whom 250 are females. In 1850 they commenced the publication of "Harper's New Monthly Magazine," which in a few years gained a circulation of 175,000 copies. In 1857 they commenced the issue of "Harper's Weekly," an illustrated newspaper. The main portion of their business, however, consists in the publication of books. Their latest catalogue embraces about 2,000 separate works, comprising more than 8,000 volumes, about equally divided between original works and reprints. James Harper, the senior partner, was elected mayor of New York in 1844. All the members of the firm have sons who are engaged in the business of the house, to which they have been trained. Of these junior members there are now 7.

HARPER, ROBERT GOODLOE, an American lawyer and statesman, born near Fredericksburg, Va., in 1765, died in Baltimore, Md., Jan. 15, 1825. His parents were respectable, but poor, and during his childhood removed to Granville, N. C. In his 15th year young Harper joined a troop of horse, and under Gen. Greene served during the latter part of the southern revolutionary campaign. He was graduated at Princeton college in 1785, while there acting for a time as tutor to lower classes. Sailing from Philadelphia for Charleston, with the intention of studying law, he arrived at his destination nearly penniless, but while standing on the pier met with a person who asked his name, and if he had not taught in Princeton college. His questioner proved to be the father of a former pupil who had become much attached to Harper, and who had named him to his parent. This new friend, a tavern keeper, provided for Harper's immediate wants, and, finding that he wished to study law, introduced him to a lawyer who received him into his office. Such was his industry that in one year he was qualified to practise. He removed into the interior of the state, soon established a reputation, and became better known by a series of newspaper articles on the proposed change in the state constitution. He was soon after elected to the legislature, and, in 1794 to the national

house of representatives. In this position he showed marked ability, supported the administrations of Washington and John Adams with hearty zeal, and was regarded as one of the leaders of the federal party. On the election of Thomas Jefferson as president in 1801 he retired from congress, and, having married a daughter of Charles Carroll of Carrollton, removed to Baltimore. At the Maryland bar he attained great eminence, at the period too of its highest renown, when at one time it could count among its members Luther Martin, Roger B. Taney, William Wirt, and William Pinkney. He was associated with Joseph Hopkinson as counsel for Judge Chase of the U. S. supreme court, when under impeachment, the trial resulting in an acquittal, March 5, 1805. In 1815 he was elected U. S. senator from Maryland, and took an active part in the debates of that and the following session. In 1819-'20 he visited Europe with his family, and on his return resumed the practice of his profession, with continued success until the time of his death. Beside his legal and political pursuits, Mr. Harper was much interested in the subject of African colonization. Selections from his writings and speeches were published in Baltimore in 1814. In private life he was universally esteemed for his high character, genial manners, and modest deportment.

HARPER, WILLIAM, an American lawyer and statesman, born on the island of Antigua, Jan. 17, 1790, whither his father had been sent as a missionary by John Wesley, died Oct. 10, 1847. He was sent to school in Baltimore, and in 1802 went with his father to Columbia, S. C. He entered the S. C. college in 1804, and, having taught school for a year in order to defray part of his expenses, was graduated in 1808. He then began the study of law, and having been admitted to the bar, settled in Columbia. In 1813 he entered the militia service, in the war with Great Britain. In 1818 he removed to Missouri, practised law in St. Louis and St. Charles counties, and in 1819 was elected chancellor. He was a member of the Missouri convention which adopted the state constitution in 1821. In 1823 he resigned his office, returned to Columbia, and was elected state reporter; he held the office for 2 years, and published a volume of reports. On March 8, 1826, he was appointed U. S. senator by Gov. Manning, on the death of the Hon. John Gaillard. During the same year he removed to Charleston, where he practised law 2 years. In 1828 he was sent from that city to the state legislature, and was elected speaker of the house of representatives. During the same session he was elected chancellor, and in 1831 he was appointed one of the 3 judges of the court of appeals. When that court was abolished in 1834 he was reelected chancellor, and he continued to discharge the duties of that office till his death. His published decisions have settled many important principles of law. Beside his decrees and judicial opinions, he wrote little which has been preserved. An article on

the colonization society in the "Southern Review;" a speech, while senator in congress, on Mr. Branch's resolution in relation to the Panama mission; a memoir on slavery, read before the South Carolina society for the advancement of learning; a eulogy on Chancellor Deshaussere, with several speeches in favor of the political doctrine of nullification, which he warmly espoused, comprise most of his literary performances.

HARPER'S FERRY, a village of Jefferson co., Va., on the Potomac river, which forms the boundary of the state with Maryland, and at the mouth of the Shenandoah, where the united streams force their passage through the Blue Ridge, 58 m. N. W. from Washington and 160 m. N. from Richmond; pop. in 1850, 1,741, or including suburbs, 3,000; in 1859, about 7,000. The village is picturesquely built around the base of a hill, and is connected with the opposite bank of the Potomac by a fine bridge about 900 feet in length, which is bifurcated on the Virginia side. The Baltimore and Ohio and the Winchester and Potomac railroads unite here, and the Ohio and Chesapeake canal follows the course of the Potomac along the Maryland bank. In 1850 the village contained 4 churches (Free, Methodist, Presbyterian, and Roman Catholic), an academy, 3 masonic halls, several manufactories, and one of the largest flouring mills in the United States. It is the seat of a U. S. arsenal, in which are stored about 90,000 stand of arms, and of an armory which employs 250 hands, and is capable of turning out 25,000 muskets every year; about 10,000 will be made in 1859. The scenery around Harper's Ferry is celebrated for its striking beauties; Thomas Jefferson pronounced the passage of the Potomac through the Blue Ridge "one of the most stupendous scenes in nature, and well worth a voyage across the Atlantic to witness." The place was formerly called Shenandoah Falls, and received its present name in honor of its first settlers.—On Sunday night, Oct. 16, 1859, the village of Harper's Ferry was suddenly invaded and taken possession of by a band of men, 23 in number, who had been for some time engaged in a conspiracy for this purpose, and had secretly gathered arms and ammunition at a farm house which they had hired 8 miles from the village. Their leader, John Brown of Osawatimie, Kansas, was a man about 60 years old, a native of the state of Connecticut, who had become prominent as a daring and resolute partisan leader of the free state forces during the civil war in Kansas in 1856-'7. In May, 1858, he had held a secret convention with a few of his confederates at Chatham in Canada West, and formed a constitution embracing the plan of a provisional government for the United States, or such of them as might be taken possession of. Brown was named commander-in-chief, and Kagi, one of his companions, was appointed secretary of war. Under this constitution several military commissions were issued signed by Brown. Of his followers in the seizure of Harper's Ferry,

were his sons, 13 others were white men from Maine, Connecticut, New York, Ohio, Indiana, and Canada, and 5 were negroes from Connecticut, Pennsylvania, and Ohio. Their object was the emancipation of the slaves in the adjacent parts of Virginia and Maryland, and their plan seems to have been to seize and hold Harper's Ferry as a place of rendezvous for the slaves, who when assembled in sufficient force were to have marched under arms through Maryland into Pennsylvania and there dispersed. The village was seized about 10 o'clock on Sunday night, the armory buildings occupied, and 40 or 50 of the government officers and workmen, together with some of the principal inhabitants of the village and its neighborhood, made prisoners. Early next morning they seized Heywood, a negro porter at the railroad depot, and ordered him to join them. He refused, and attempting to escape was shot dead. They had already placed sentinels at the gates of the principal buildings of the armory. A workman going early to the government workshop was arrested by one of their guards, and escaping was fired at as he ran, the bullet going through his hat. Mr. Boerly, a grocer, witnessing this occurrence from his shop, came out with a gun and fired at the guard. He was fired upon in return, and instantly killed. A few hours later Capt. George Turner, formerly an officer of the U. S. army, and Mr. Fontaine Beckham, mayor of the town, while reconnoitering the position of the invaders (against whom the people of Harper's Ferry, aided by volunteers from neighboring towns, had now begun a desultory resistance), were shot dead. Their deaths created great exasperation, as they were both prominent and highly esteemed citizens. A military company from Jefferson assaulted and captured a building held by 5 of the invaders, 4 of whom were killed and the 5th made prisoner. Brown and the rest of his men, excepting 4 who had retreated at an earlier period to the mountains, now retired, together with the prisoners and a few slaves who had joined him, it is said on compulsion, into the fire engine house within the armory enclosure. Two of his men coming out to hold a parley, one of them, Aaron L. Stephens, was shot and severely wounded; the other, Thompson, was taken prisoner, and subsequently killed in revenge for Mayor Beckham's death. At 3 P. M. about 20 of the railroad men made a dash at the engine house, broke open the door, and killed 2 of Brown's men, but were repulsed with 7 of their number wounded. In the course of the day the village was occupied by 1,000 or 1,500 armed men from the neighboring country, including several volunteer military companies, but no further attacks were made upon the engine house from apprehension for the safety of the citizens who were held prisoners. On Monday night Col. Lee of the U. S. army arrived from Washington, with 2 pieces of artillery and about 100 marines. Early on Tuesday morning Brown was summoned to surrender. He refused, except upon condition of being

allowed to cross the Potomac unpursued. This was refused, and when the parley ended the door of the engine house was burst open by the marines, who used a heavy ladder as a battering ram. They rushed in, and one of the first to enter, a private named Quinn, was shot dead. Brown, fighting desperately to the last, was cut down by a sabre stroke and stabbed 2 or 3 times with bayonets. All of his companions were killed or wounded except two, who were taken prisoners without injury. Of the whole band of 22 men, 10 whites and 8 negroes were killed, 3 whites, 2 of them severely wounded, and 2 negroes, were taken prisoner, and 4 escaped, two of whom, J. E. Cook and William Hazlitt, were subsequently captured in Pennsylvania and delivered to the authorities in Virginia. In a few days Brown was indicted for treason and murder, put upon his trial before the county court of Jefferson co., found guilty, and sentenced to be hanged on Dec. 2, 1859. His remaining companions were also tried, convicted, and sentenced to be hanged on Dec. 16, with the exception of Aaron L. Stephens, who was handed over to the U. S. authorities for trial on charges of murder and treason committed within their jurisdiction.

**HARPIES** (Gr. *Ἄρπυιαι*, from *ἀρπάζω*, to rob or spoil), in ancient mythology, fabulous monsters, said to have been the daughters of Neptune and Terra, or, according to Hesiod, of Thaumias and Electra. In Homer they are merely personified storm winds, who were believed to have carried off any person that had suddenly disappeared. In Hesiod they are fair-haired and winged maidens who surpass the winds in swiftness; but in later writers they are represented as disgusting monsters, with faces pale with hunger and claws like those of birds. The harpies ministered to the gods as the executors of vengeance. They were 2 or 3 in number, and dwelt in the Strophæadæan isles, in the Ionian sea. The most celebrated myth in which the harpies figure is that of the blind Phineus, whose food they had been commissioned to snatch away as often as it was placed before him. The Argonauts arrived at his residence while he was thus tormented, and freed him from the persecution. In the famous harpy monument discovered in Lycia by Sir O. Fellows, and now in the British museum, the harpies are represented in the act of carrying off the daughter of Pandaræus.

**HARPOCRATES**, in ancient mythology, the god of mystery and silence, supposed to be identical with the Egyptian divinity Horus. He was represented as a youth, and was believed to have been born with his finger on his mouth as indicative of caution and secrecy. His worship was widely spread over Greece and Italy; but at Rome it was at one time interdicted by the senate.

**HARPOCRATION**, **VALERIUS**, a Greek philologist, who flourished probably about the middle of the 4th century A. D. He was a native of Alexandria in Egypt, and the author of a valuable lexicon, still extant, to the works of



the Attic orators. The earliest edition was published at Venice in 1503; the most recent is that of Bekker, which appeared at Berlin in 1833.

**HARPOON**, a javelin-like instrument of iron, about 3 feet in length, used in striking whales. It consists of a shank terminating at one end in a socket to which a long rope is attached, and at the other end in a broad flat head, sharpened so as to penetrate the whale with facility, and furnished with barbs or withers. The rope, called the whale line, is coiled in the boat so as to run out without becoming entangled, and is about 70 fathoms long, so that the whale may dive after the harpoon has been fastened into him. The harpoon is usually thrown by hand, but a harpoon gun has been invented, capable of throwing the instrument nearly 40 yards with effect. The address which is requisite to manage it successfully has however prevented its general adoption. (See BOMB LANCE.)

**HARPSICORD**, a keyed musical instrument, somewhat in the form of a grand piano, in which the sounds are produced by the action of oblong slips of wood called jacks, furnished with crowquill plectrums, and moved by finger keys, upon a series of stretched wires, resembling a horizontal harp. It was provided with stops for increasing or diminishing the power of the strings, and with a swell; and the best instruments had a compass of 5 octaves, from double F below the base to F in altissimo. The harpsichord was in use as early as the 15th century, and gradually took the place of the spinet and virginals, on which it was an improvement. It remained the highest form of the keyed instrument until the introduction of the pianoforte into general use in the latter part of the 18th century, but is now in little repute, and is probably no longer manufactured.

**HARPY**, in mythology. See **HARPIES**.

**HARPY**, a bird of prey, of the sub-family *aquilina* or eagles; the *harpyia destructor* (Ouv.) or *thrasaëthus harpyia* (Linn.), and the crested, crowned, royal, tyrant, and destructive South American eagle of authors. The bill is strong, much curved at the acute tip; the wings moderate, reaching beyond the base of the tail, the 4th, 5th, and 6th quills the longest; tail long, broad, and slightly rounded; tarsi short and very thick, toes robust, armed with powerful claws. The length is from 2½ to 3 feet, and the spread of the wings 5 to 6 feet. The bill is black, the head crested; the general color is dark brown above and white below, the feathers of the breast very long and loose; the tail barred with brown and black, and the vent and thighs with black and white. Several varieties of plumage occur, which have been made characters of different species, but Gray describes only one in the genus. The harpy eagle lives in the dark forests of intertropical America, especially near the borders of great rivers; it preys on sloths, monkeys, large birds, and on young deer and other quadrupeds of that size. Its strength and courage are such that it will attack very large animals, and even man himself

according to the stories of the Indian inhabitants; making due allowance for popular exaggeration, it is evident from the description of Sonnini that the harpy is one of the most powerful and bold birds of prey, coming as near as any to the fabled monsters of Grecian mythology.

**HARQUEBUSE**. See **ARQUEBUSE**.

**HARRIER**, a variety of the hound (canis *sagax*, Linn.), used in hare hunting. The ancient harrier (*chien courant* of the French) had a moderately long, broad muzzle; thick and rounded head; large, long, and pendent ears; robust body, stout limbs, erect tail, and short hair, varied with black, brown, and yellowish spots. The modern improved harrier is a miniature fox hound, with shorter ears, an acute sense of smell, great speed, and a height of about 18 inches. The old harrier was larger, slower, and more inclined to dwell on the scent; the modern breed does not generally allow the hare to double on its tracks, but forces it into a straight course, running it down in about 20 minutes. The pack of Sir John Dashwood King, considered the model of this dog, originated from a small fox hound of pure breed, which was so celebrated that he was sold for the enormous sum of £700. The old harrier came near the beagle in appearance and manner of hunting. There are several breeds of more interest to the sportsman than the zoologist.

**HARRIER**, a hawk of the sub-family *ceriæ* of Gray and *milvina* of later ornithologists, and of the genus *circus* (Lacépède). The genus is characterized by a rather large head, and a face partially encircled by a ring of short prominent feathers as in the owls; bill short, compressed, curved from the base, with the lateral margins festooned; nostrils large; wings long and pointed, with the 3d and 4th quills nearly equal and longest; tail long, wide, and rounded on the sides; tarsi long and slender, toes moderate, and claws rather slender and weak. About 15 species are described in various parts of the world, generally found in open uncultivated countries, in marshes, and along barren sea coasts. The flight is not very swift, but easy and graceful, and generally performed in a sailing manner within a few feet of the ground. The American harrier, marsh or hen hawk (*C. Hudsonius*, Linn.), has in the male a length of about 18 and an extent of wings of 44 inches, and in the female a length of 21 and a spread of about 47 inches. The form is rather long and slender; the general color above is pale bluish cinereous, which prevails also on the breast; the upper tail coverts white; dark fulvous tinges on the back of the head; under parts white, with more or less heart-shaped spots and longitudinal marks of reddish fulvous; quills brownish black, tinged with ashy on the outer webs, and the inner mostly white; tail cinereous, nearly white on the inner webs, and obscurely banded with brown, its under surface and the under wing coverts white. In the young birds the upper parts are dark brown, with dull rufous edges to many of the feathers; under parts reddish

white, with brown stripes, and upper tail coverts white. It is found throughout North America from Mexico to the arctic regions, from the Atlantic to the Pacific, and in Cuba. It breeds in most parts of the United States, and is often seen in flocks of 20 or 80. When paired, the sexes keep together, and assist each other in the care of the young. The nest is generally made on the ground, previously scooped out, of dried grasses, and of considerable bulk; sometimes they build in low bushes. The eggs, about 4, are rounded, smooth,  $1\frac{1}{2} \times 1\frac{1}{4}$  inches, bluish white, with a few marks of pale reddish brown. The bird skims over the open fields, diligently searching for food, which consists of crickets, lizards, frogs, snakes, and small birds and quadrupeds; it is fond of visiting remote poultry yards after young chickens and goslings, though a hen of ordinary courage is usually able to drive it off; it rarely strikes its victims on the wing. The ring-tailed harrier of Europe is the *C. cyaneus* (Linn.); there are also Montagu's harrier (*C. cineraceus*, Mont.), and the moor or marsh harrier (*C. aeruginosus*, Linn.), having similar habits with the American species.

HARRING, HARBO PAUL, an adventurous Dane, born in Ibensdorf, near Hussum, Aug. 27, 1798. He was the son of a Frisian landholder, and was first employed in the custom house. Afterward he studied the fine arts, and wrote several volumes of poetry. His restless and erratic disposition led him to travel in many countries, to enlist as a soldier in Warsaw, and to take part in liberal political movements in Germany and Switzerland. He was arrested in Bern in 1836, fought a duel in England in 1837, was again arrested in Helgoland, made his escape by leaping from the vessel into the sea, practised painting in Brazil, was expelled from Norway in 1850 on account of his attempts to revolutionize that country, became a member of the European democratic committee in London, was imprisoned in Hamburg in 1854, but released at the instance of the American consul, was again in Brazil in 1856, and afterward returned to London. He visited the United States about 1844. He is the author of a great number of works in light literature, of which the principal is "Dolores," a story of South American life (8 vols., New York and London).

HARRINGTON, JAMES, an English political writer, born in Upton, Northamptonshire, in Jan. 1611, died in Westminster, Sept. 11, 1677. He entered Trinity college, Oxford, in 1629, and studied under the famous Chillingworth, becoming well versed in the classics and several foreign tongues. After leaving the university, he travelled on the continent, visiting France, Italy, and the Hague, where he entered Lord Craven's regiment, then quartered in that city. During his residence in Holland he turned his thoughts to the philosophy of politics and the science of government, and enjoyed the friendship of the prince of Orange. On his return to England he lived for a time in retirement, but in 1646 was appointed to wait upon Charles

I. during his confinement. The king became strongly attached to him, and made him groom of the bedchamber, and Harrington, still republican in principle, became loyal to the person of the monarch, following him even to the scaffold. After the death of Charles, he went into retirement and composed his great work, the "Oceana," which was seized by order of Cromwell while in the press; but, after many vain efforts, through the intercession of Mrs. Claypole, the protector's daughter, secured by an ingenious artifice on his part, he was finally permitted to publish it in 1656, and even to dedicate it to Cromwell himself. The "Oceana" is a kind of political romance, like Plato's "Republic" and the "Utopia" of Sir Thomas More, in which Harrington describes an imaginary ideal republic, defining the fundamental principles of a republican government, which he bases upon an equal division of landed property. Montesquieu accuses him of dreaming of an ideal republic when the constitution of his own country was before him, a model of a free government, and says: "He has sought for liberty, but has failed to recognize it when before his eyes." The "Oceana" attracted much attention, and was answered by several persons, the principal work written in reply being Baxter's "Holy Commonwealth." In 1659 Harrington published an abridgment of his work, under the title of the "Art of Law-giving," and instituted a club called the "Rota" for the propagation of his principles, which was dissolved, Feb. 29, 1660. Harrington was arrested on a charge of treason, Dec. 28, 1661, being suspected of an intent to overthrow the government and establish a republic. His health was impaired and his mind became deranged by his imprisonment, and he was after a time liberated through the intercession of the earl of Bath. He went to London, where he partially recovered his bodily health, but never regained the full vigor of his intellect. Beside the "Oceana," Harrington published "Aphorisms," "An Essay upon two of Virgil's Eclogues and two of his *Æneid*, toward the translation of the whole" (1658), and later a translation of 4 books of the *Æneid*. His political writings have gone through several editions, and have been translated into French by Henry. An edition of his works was published by Toland in 1700, in 1 vol. fol.; another edition by Birch appeared in 1737, and a third in 1747.

HARRIOT, THOMAS, an English mathematician, born in Oxford in 1560, died in London, July 2, 1621. He received the degree of B.A. at Oxford in 1579, and accompanied Sir Walter Raleigh on his voyage to Virginia in 1584, writing on his return an account of the country, under the title of "A Brief and True Report of the new-found Land of Virginia," which was republished in the 8d volume of Hakluyt's "Voyages." He was introduced by Raleigh to the earl of Northumberland, and received from him a pension of £300. Thenceforward he devoted himself to the study of mathe-

tics, more particularly to algebraic analysis, in which he conceived several important improvements. His researches were published in 1681 by his friend Walter Warner (who had shared with him the imprisonment of their patron the earl of Northumberland), under the title, *Artis Analyticae Praxis ad Aequationes Algebraicas Resolvendas*. He simplified the methods of notation of preceding writers, and was the first who conceived the idea of placing all the terms of an equation upon the same side. He corresponded with Kepler upon the theory of the rainbow, and it appears from his manuscripts that he observed the spots upon the sun before he could have known of Galileo's discovery of them. His fame rests chiefly upon his mathematical researches.

HARRIS, I. A. W. co. of Ga., separated from Alabama by the Chattahoochee river, and drained by several small branches of that stream; area, about 440 sq. m.; pop. in 1852, 14,486, of whom 7,579 were slaves. It has a greatly diversified surface; the E. part is traversed by the Pine and Oak mountains, and large tracts of land are covered with forests. The productions in 1850 were 554,895 bushels of Indian corn, 82,187 of oats, 109,926 of sweet potatoes, and 11,985 bales of cotton. There were 16 grist mills, 14 saw mills, 6 tanneries, 81 churches, and 206 pupils attending public schools. Value of real estate in 1856, \$1,651,891. Capital, Hamilton. II. An E. co. of Texas (formerly Harrisburg), bordering on Galveston bay, and drained by San Jacinto river and Buffalo bayou, both of which are navigable by steamboats; area, 1,832 sq. m.; pop. in 1856, 6,448, of whom 890 were slaves. The surface is a fertile alluvial plain, nearly destitute of timber except along the streams, and covered with rich savannas which pasture large numbers of horses and cattle. The productions in 1850 were 49,664 bushels of Indian corn, 20,371 of sweet potatoes, 80,860 lbs. of butter, 11 bales of cotton, and 6 hogsheads of sugar. There were 3 grist mills, 9 saw mills, 2 newspaper offices, 7 churches, and 276 pupils attending public schools. The Buffalo bayou, Brazos, and Colorado, and the Houston and Texas central railroads, pass through the county. Capital, Houston.

HARRIS, JAMES, an English philologist, born in Salisbury, July 20, 1709, died Dec. 22, 1780. His mother was a sister of the celebrated Lord Shaftesbury. He entered Wadham college, Oxford, as gentleman commoner, and thence passed as probationer to Lincoln's Inn. His father died when he was 24 years of age, leaving him a handsome fortune, so that he abandoned the law, retired to his native town, and devoted himself to more congenial pursuits. He was elected to parliament for the borough of Christchurch in 1761, and filled that seat during the rest of his life. In 1762 he was appointed one of the lords of the admiralty, and in the following year a lord of the treasury, but went out of office with the change of administration in 1765. In 1774 he was appointed secretary

and comptroller to the queen. In 1744 he published "Three Treatises: I. Art; II. Music, Painting, and Poetry; III. Happiness;" and in 1751 his famous work, "Hermes, or a Philosophical Inquiry concerning Universal Grammar," which has been considered a model of ingenious analysis and clear exposition, Lowth claiming for it that it is the best specimen of analysis since the time of Aristotle. In 1775 Harris published "Philosophical Arrangements," as part of a projected work upon the "Logic" of Aristotle. His "Philosophical Inquiries" was published after his death, in 1731. His works were collected and published in 1792; a fine edition, with a biographical sketch, was published by his son, Lord Malmesbury, in 1801 (2 vols. 4to., London).

HARRIS, JOHN, D.D., an English dissenting divine and author, principal of New college, St. John's Wood, London, born in Uxbridge, Devonshire, in 1804, died in London, Dec. 21, 1866. In 1823 he became a student of divinity in Hoxton Independent college, and, after completing his course, was chosen pastor of the Independent church in Epsom. In 1838 he became professor of theology in Cheshunt college, designed to educate students for the countess of Huntingdon's connection. When in 1850 it was determined to consolidate the various Independent colleges in and about the metropolis into one, Dr. Harris was invited to become principal of the new institution, called New college, in which he was also professor of theology. While at Epsom he had first been brought into notice as the successful competitor for a prize essay against covetousness. This work, under the title of "Mammon" (1836), gained great popularity, more than 80,000 copies being soon issued. Other works written for prizes were "Britannia" (1837), an appeal in aid of the objects of the British and foreign sailors' society, and "The Great Commission" (1842), an elaborate essay on Christian missions. His most important later publications are a series of 8 works, entitled the "Pre-Adamite Earth" (1847), "Man Primæval" (1849), and "Patriarchy, or the Family, its Constitution and Probation" (1855). Most of his works have been republished in Boston.

HARRIS, THADDEUS WILLIAM, M.D., an American naturalist, born in Dorchester, Mass., Nov. 12, 1795, died in Cambridge, Jan. 16, 1856. He was graduated at Harvard college in 1815, studied medicine with Dr. Amos Holbrook of Milton Hill, subsequently his father-in-law, and practised his profession in the same village until he was appointed librarian of Harvard college, and removed to Cambridge in 1831. This position he occupied until his death. Early in life he exhibited a fondness for natural history, derived perhaps from his father, the Rev. Dr. Thaddeus M. Harris. Destitute of books, he was led to study the habits and development of objects as they occur in life, rather than systems; and though plodding alone, he attained to a scientific eminence

which secured for him the fellowship of all the principal learned societies of America, and of many abroad. For several years he gave instruction in botany and general natural history in the college, and he originated the Harvard natural history society for the students. He was chiefly distinguished, however, as an entomologist, and has been surpassed as such by no one in the United States. His observations, promulgated from time to time through periodicals and in public lectures, are characterized by thorough investigation and great clearness of description. More than 50 of his papers have been catalogued. They appeared chiefly in the "New England Farmer," Hovey's "Horticultural Magazine," the "Massachusetts Plowman," the "Encyclopædia Americana," the "Transactions" of the academy of sciences at Philadelphia and of the Hartford natural history society, the "Journal and Proceedings" of the Boston society of natural history, the "Cambridge Chronicle," &c. He was one of the founders of the Massachusetts horticultural society. In 1837 he was appointed one of the commissioners for a zoological and botanical survey of Massachusetts, the result of which was his "Systematic Catalogue of the Insects of Massachusetts" (8vo., 1832), in which 2,350 species are enumerated. This commission being further continued, he limited himself to the consideration of such a portion of his field as he thought would be most useful and interesting to the public; this formed his "Report on Insects Injurious to Vegetation" (8vo., 1841), published by the legislature, which embodies most of his papers previously published, with the addition of many new observations. This "Report," somewhat enlarged, was reprinted by the author under the title of "A Treatise on some of the Insects of New England which are Injurious to Vegetation" (8vo., 1842), and again with further additions in 1852. It is to be again republished with illustrations under the auspices of the state. His extensive collection of North American insects, together with the catalogues and drawings relating to them, were purchased by subscription for the Boston society of natural history.

HARRIS, WILLIAM, D.D., president of Columbia college, N. Y., born in Springfield, Mass., April 29, 1765, died Oct. 18, 1829. He was graduated at Harvard college in 1786, was ordained priest in the Episcopal church in 1792, and took charge at once of the church and academy in Marblehead, Mass. In 1802 he accepted the rectorship of St. Mark's church in New York city, where he established a classical school of a high character. He was chosen in 1811 to succeed Bishop Moore as president of Columbia college, and for 6 years retained his rectorship in connection with this office. During that period he was assisted in the duties of the presidency by Dr. J. M. Mason, under the title of provost, an office which was abolished in 1816; from which time until his death Dr. Harris devoted himself entirely to the college.

HARRISBURG, the capital of the state of Pennsylvania, and of Dauphin co., situated on the left bank of the Susquehanna, lat. 40° 16' N., long. 76° 50' W., 107 m. W. by N. from Philadelphia, and 110 m. N. by E. from Washington; pop. in 1850, 7,834; in 1859, 14,000. It is surrounded by magnificent scenery and fertile lands. Seven railroads radiate from it, and the Pennsylvania canal passes through it. There are two fine bridges across the Susquehanna, here a mile wide, with an island in the middle. There are 3 iron furnaces, a rolling mill, a cotton mill, a car factory, and a variety of other manufacturing establishments. The town is amply supplied with water from the Susquehanna, the water works having been completed in 1841. Gas was introduced in 1850. The borough contains 15 churches (1 Baptist, 1 Church of God, 2 Episcopal, 1 German Reformed, 2 Lutheran, 8 Methodist, 3 Presbyterian, 1 Roman Catholic, and 1 United Brethren), a state arsenal, several good hotels, 2 banks, a savings bank, and 8 or 10 newspaper offices. The capitol, finely situated on an eminence, is a handsome brick building 180 feet long by 80 feet wide, with a circular Ionic portico in front surmounted by a dome. There is a smaller building of similar design on each side of it, devoted to government uses. It was begun in 1819, and occupied for the first time Jan. 28, 1822. The state lunatic hospital, north of the town, was opened in 1851; it can accommodate 300 patients. The county court house, a plain brick building, was erected in 1785; the county prison, a neat stone structure, in 1841. The public schools are commodious brick buildings. There are also an academy for boys, a flourishing female college, and a number of private schools. The first white settlement at this place, the site of an Indian village called Peixtan, Pextang, or Paxton, was made about 1719, by an Englishman named John Harris, who, in Dec. 1733, obtained from the proprietaries of Pennsylvania a grant of 800 acres of land near his residence, and purchased of other grantees 500 acres adjoining. He carried on a considerable trade with the Indians of the vicinity. In 1753 the Penns granted to his son, John Harris, jr., the right to establish a ferry over the Susquehanna, and the place was long known as Harris's Ferry. In 1784 the town was laid out, and it became the seat of justice of the new county taken from Lancaster and called Dauphin, after the French crown prince; the town also received, in honor of Louis XVI., the name of Louisbourg, which it retained till 1791, when it was changed to Harrisburg. In the same year it was incorporated as a borough, and still continues to be legally only a borough, governed by a burgess and town council. In 1812 the seat of the state government was removed from Lancaster to Harrisburg.

HARRISON, the name of 8 counties in the United States. 1. A N. W. co. of Va., drained by the W. fork of Monongahela river; area, 440 sq. m.; pop. in 1850, 11,728, of whom 488 were slaves. It has a hilly surface, a fertile

soil, and abounds in timber, coal, and iron. The productions in 1850 were 277,585 bushels of Indian corn, 47,662 of wheat, 87,453 of oats, 8,928 tons of hay, and 178,206 lbs. of butter. There were 17 grist mills, 18 saw mills, 1 iron foundery, 8 tanneries, 2 newspaper offices, 19 churches, and 380 pupils attending public schools. Value of real estate in 1856, \$4,383,858, showing an increase since 1850 of 45 per cent. The N. W. Virginia railroad passes through Clarksburg, the capital. The county was named in honor of Benjamin Harrison. II. A S. E. co. of Miss., bordering on the gulf of Mexico, and drained by Biloxi and Wolf rivers; area, 870 sq. m.; pop. in 1850, 4,876, of whom 1,441 were slaves. The surface is level and mostly covered with pine woods, and the soil is light and sandy. The productions in 1850 were 9,524 bushels of Indian corn, 19,894 of sweet potatoes, and 81,380 lbs. of rice. There were 3 grist mills, 17 saw mills, 1 newspaper office, 5 churches, and 100 pupils attending public schools. Capital, Mississippi City. III. A N. E. co. of Texas, bordering on Louisiana, bounded N. by Big Cypress bayou and Caddo lake, and S. by Sabine river; area, 964 sq. m.; pop. in 1856, 18,752, of whom 7,203 were slaves. The surface is diversified by prairies and forests; the soil is fertile, and the productions in 1850 were 876,600 bushels of Indian corn, 8,938 of oats, 126,768 of sweet potatoes, 4,581 bales of cotton, and 47,061 lbs. of butter. There were 3 grist mills, 4 saw mills, 2 iron founderies, 2 newspaper offices, 11 churches, and 496 pupils attending public schools. Value of real estate in 1857, \$1,989,800. The county is crossed by the routes of the Mexican gulf and Henderson, and the Southern Pacific railroads, not yet completed. Capital, Marshall. IV. A N. E. co. of Ky., drained by Licking river and by the S. branch of that stream; area, 356 sq. m.; pop. in 1850, 18,064, of whom 3,185 were slaves. The surface is diversified by hills and tracts of rich rolling land, the soil is fertile and well adapted for grazing, and blue limestone is abundant. The productions in 1850 were 1,400,281 bushels of Indian corn, 44,380 of wheat, 124,706 of oats, 93,927 lbs. of tobacco, 48,028, of wool 14,170 of flax, and 3,208 tons of hay. There were 60 grist mills, 9 saw mills, 1 newspaper office, 21 churches, and 1,201 pupils attending public schools. Value of real estate in 1855, \$3,915,732. The Lexington and Covington railroad passes through Cynthiana, the county seat. V. An E. co. of Ohio, drained by branches of the Ohio and Tuscarawas river; area, 420 sq. m.; pop. in 1850, 20,157. It has a hilly surface and a rich soil. Limestone and iron are found. The productions in 1850 were 503,771 bushels of Indian corn, 235,152 of wheat, 264,124 of oats, 15,270 tons of hay, and 806,161 lbs. of wool. There were 18 grist mills, 14 saw mills, 1 cotton factory, 10 tanneries, 2 newspaper offices, 56 churches, and 2,634 pupils attending public schools. The Pittsburg, Columbus, and Cincinnati railroad passes through the county, and is connected by

a branch railroad with Cadiz, the capital. VI. A S. co. of Ind., separated from Kentucky by the Ohio river, and bounded W. by Blue river; area, 478 sq. m.; pop. in 1850, 15,286. It has an uneven surface broken by "knobs" and hills, and based partly on carboniferous limestone. It abounds in natural caverns, one of which, called Pitman's cave, extends more than 2 m. under ground. Near it is a remarkable spring 60 feet in diameter and several hundred feet deep. The soil is mostly good. The productions in 1850 were 549,276 bushels of Indian corn, 108,819 of wheat, 154,739 of oats, and 2,450 tons of hay. There were 27 grist mills, 14 saw mills, 1 newspaper office, 41 churches, and 2,323 pupils attending public schools. Organized in 1808. Capital, Corydon. VII. A N. W. co. of Mo., bordering on Iowa, and watered by affluents of Grand river; area, 754 sq. m.; pop. in 1856, 7,649, of whom 8 were slaves. It consists in large part of prairies, and has much fertile soil near the rivers. The productions in 1850 were 80,980 bushels of Indian corn, 4,120 of wheat, 16,284 of oats, 5,466 lbs. of wool, 16,482 of butter, and 464 tons of hay. There were 1 church, and 878 pupils attending public and other schools. Capital, Bethany. VIII. A W. co. of Iowa, separated from Nebraska by the Missouri, and crossed by Boyer and Soldier rivers; area, about 480 sq. m.; pop. in 1856, 1,900; productions, 95,917 bushels of Indian corn, 6,786 of wheat, 4,116 of oats, 12,481 of potatoes, and 23,909 lbs. of butter. Capital, Magnolia.

HARRISON, BENJAMIN, an American statesman, born in Berkeley, Charles City co., Va., on the James river, about 1740, died in April, 1791. He entered public life in 1764 as a member of the Virginia house of burgesses, of which he soon became one of the leaders. During the agitation of the stamp act question, the governor of Virginia unsuccessfully attempted to secure his support by offering him a seat in the executive council. He participated in the proceedings of the first continental congress as delegate from Virginia, subsequently signed the declaration of independence, and served with credit as chairman of the board of war and on other important committees until the close of 1777, when he returned to Virginia. He was immediately elected to the house of burgesses, over the proceedings of which he presided until 1782, when he was chosen governor of the commonwealth, having in the interval been influential in bringing the Virginia militia into some efficiency. In 1785, after having been twice reelected governor, he returned to private life. He was a member of the state convention which met in 1788 to ratify the federal constitution, and at the time of his death of the state legislature.

HARRISON, JOHN, an English mechanic, born at Faulby, near Pontefract in Yorkshire, in 1693, died in London in 1776. He was the son of a carpenter, and in his youth worked in his father's shop. A taste for mechanical pursuits, however, led him to study the construction of clocks, and in 1736 he effected certain im-

provements, which insured much greater accuracy than had previously been attained in time-pieces. (See *CLOCKS AND WATCHES*, vol. v. p. 359.) In 1714 parliament offered prizes of £10,000, £15,000, and £20,000 respectively for a method of ascertaining longitude within 60, 40, or 30 miles. Mr. Harrison constructed a chronometer which was satisfactorily tested on a voyage in 1736, and by successive improvements on it secured the highest prize in 1767. (See *CHRONOMETER*.) His inventions, the gridiron pendulum, the going fusee, the compensation curb, and the remontoir escapement, were considered the most remarkable in the manufacture of watches of the last century.

HARRISON, WILLIAM HENRY, 9th president of the United States, born in Berkeley, Charles City co., Va., Feb. 9, 1773, died in Washington, April 4, 1841. He was the 3d and youngest son of Benjamin Harrison (see above). Being left by his father's death to depend upon himself, at the age of 19 years, with the commission of ensign, he joined the army employed first under St. Clair, and afterward under Wayne, against the western Indians. His spirit and sagacity attracted the attention of Wayne, who appointed him an aide-de-camp, in which capacity he served through the war. Soon after its close in 1795 he was promoted to the rank of captain and placed in command of Fort Washington, then occupying the site of the present city of Cincinnati, laid out soon after by John Cleves Symmes, a daughter of whom Capt. Harrison married. In 1797 he resigned his commission in the army, and was appointed secretary of the territory N. W. of the Ohio, from which in 1799 he was chosen a delegate to congress. The north-western territory having been divided, Harrison was appointed in 1801 governor of the new territory of Indiana, embracing the present states of Indiana, Illinois, Michigan, and Wisconsin. Almost the whole of it was then in possession of the Indians, with whom as superintendent he made several important treaties in which large cessions of territory were obtained. The agitation among the Indians caused by Tecumseh and his brother the prophet having assumed the character of hostilities, Harrison in the autumn of 1811 advanced against the prophet's town at the head of 800 men, partly regulars and partly volunteers. His camp at Tippecanoe was furiously but unsuccessfully attacked on the night of Nov. 5. The defeated Indians were at first inclined to treat, but the breaking out of the war with Great Britain made them again hostile. After Hull's surrender, Harrison was appointed, in Sept. 1812, to the command of the N. W. frontier, with a commission as brigadier-general. It was not till the next year, by which time he was promoted to the rank of major-general, that he was able to commence active operations. Several mishaps grew out of the inexperience of his subordinate officers, but the victory of Perry on Lake Erie enabled him to recover from the British invaders the American territory which they had occupied, and to pur-

sue them into Canada, where on Oct. 5 they were totally routed in the battle of the Thames. A peace with the N. W. Indians soon followed. Not long after, in consequence of misunderstandings with Armstrong, the secretary of war, Harrison resigned his commission in the army. In 1816 he was elected from the Cincinnati district a member of the U. S. house of representatives, in which body he sat for 3 years. In 1819 he was elected a member of the state senate of Ohio, which place he held for 2 years. Having been elected to the senate of the United States, he took his seat in 1824, and was appointed chairman of the military committee in place of Gen. Jackson, who had just resigned his seat in that body. In 1828 he was appointed by President John Q. Adams minister plenipotentiary to the republic of Colombia. He landed at Maracaibo Dec. 23, and thence proceeded to Bogota; but his residence there was not long, as he was recalled immediately on Jackson's accession to the presidency in 1829. For several years after his return he took no active part in political affairs, but lived retired on his farm at North Bend on the Ohio, a few miles below Cincinnati. Being in but moderate pecuniary circumstances, he accepted the office of clerk of the county court, which he continued to hold for the next 12 years. In 1836, as the close of Gen. Jackson's 2d term of office drew near, the opposition were somewhat at a loss for a candidate for the presidency. Mr. Webster had been nominated in Massachusetts, but did not find much support out of that state; and Mr. Clay did not care to be a candidate in a contest which he regarded as hopeless. The success of Gen. Jackson gave rise to the idea of adopting a candidate who had military reputation. Harrison, while in command of the N. W. department during the war of 1812, had enjoyed a high popularity in the West, and principally on that ground he was now brought forward as a presidential candidate. His character was unimpeachable, his retirement had kept him out of the sphere of party, and his position as a simple citizen seemed to identify him as one of the people. His nomination, seconded also by the anti-masons, was more successful than many had anticipated; he received 78 electoral votes, a greater number than Clay had obtained 4 years before, though Massachusetts, which now voted for Mr. Webster, then voted for him. The financial crisis which followed the election of Mr. Van Buren greatly strengthened the opposition. The prospect of defeating his reelection was very strong if the opposition could unite upon a candidate. Mr. Clay was again brought forward and strongly urged. Gen. Scott was also proposed. A national nominating convention, at which 23 states were represented, met at Harrisburg, Dec. 4, 1839, to decide between them. On the ground of availability, Gen. Harrison was preferred, and received the nomination. A very ardent and exciting canvass followed. On the part of the supporters of Gen. Harrison every means was availed of to arouse the popular enthusiasm.

Mass meetings and political processions were now first brought into general use, and this canvass marks an era in the style of conducting elections. The slur which had been cast upon Gen. Harrison that he lived in a "log cabin," with nothing to drink but "hard cider," was seized upon as an electioneering appeal. Log cabins became a regular feature in political processions, and "hard cider" one of the watchwords of the party. Gen. Harrison's success was complete; he received 234 electoral votes to 60 for Mr. Van Buren. He was inaugurated president, March 4, 1841. His cabinet was judiciously composed, and great expectations were formed of his administration; but within a month, and before any distinctive line of policy could be established, he died, after a brief illness of only 8 days, brought on, it was supposed, by the fatigue and excitement incident to his inauguration.

**HARRODSBURG**, a township and the capital of Mercer co., Ky., situated near the centre of the state on a small branch of Salt river, 8 m. S. from the Kentucky river, and 80 m. S. from Frankfort; pop. in 1853, about 3,000. The village, built on high ground and surrounded by fine scenery, is an attractive summer retreat, and enjoys a reputation for its mineral waters. The Harrodsburg springs are among the most fashionable places of resort in the western states. There are good accommodations for visitors, and many of the residences are tastefully built. An important trade is carried on in horses, cattle, other live stock, and dry goods. In 1850 the township contained 5 churches (African, Baptist, Christian, Methodist, and Presbyterian), male and female academies, a weekly newspaper office, a bank, 2 hemp factories, and 2 wool carding mills. It is the seat of Bacon college, founded in 1836, and having in 1852, 5 professors, 75 students, and a library of 1,200 volumes. A railroad now in progress will connect Harrodsburg with Louisville. Harrodsburg is said to be the oldest town in Kentucky, the first cabin having been built in 1774 by Capt. James Harrod.

**HARROW-ON-THE-HILL**, a village of Middlesex, England, 10 m. N. W. from London; pop. in 1851, 4,951. It contains an ancient parish church having a lofty tower and spire, places of worship for Baptists and Methodists, and a free grammar school which was founded in 1571 by John Lyon, a wealthy yeoman of the parish. This school was originally intended for the gratuitous instruction of poor boys belonging to the parish of Harrow, but it is now principally attended by the sons of the nobility and gentry, and is in high repute as an educational institution. Among the celebrated men who have been educated there are Sir William Jones, Dr. Parr, Lord Byron, and Sir Robert Peel. Harrow school chapel has been much improved since 1856. A new aisle has been added from funds subscribed by the masters and parents of the pupils, and a beautiful chancel erected at a cost of about \$18,000, at the ex-

penses of the head master, Dr. Vaughan, who resigned his office in 1859.

**HART**. I. A N. E. co. of Ga., separated from S. Carolina by the Savannah river, and watered by several small branches of that stream; area, about 250 sq. m.; value of real estate in 1856, \$636,142. It has been recently formed from Franklin and Elbert cos., and is not included in the state census of 1852. II. A central co. of Ky., in the region called the "barrens," watered by Green river, which is here navigable by steamboats; area, 432 sq. m.; pop. in 1850, 9,098, of whom 1,301 were slaves. The surface is diversified by small hills thinly covered with oak and other timber, and is perforated by many limestone caverns; the soil is fertile. The productions in 1850 were 434,613 bushels of Indian corn, 88,550 of oats, 814,444 lbs. of tobacco, and 19,692 of wool. There were 13 grist mills, 2 saw mills, 11 churches, and 650 pupils attending public schools. Value of land in 1855, \$828,717. The Louisville and Nashville railroad passes through Mumfordsville, the capital. Formed in 1819, and named in honor of Capt. Nathaniel Hart.

**HART, JOEL T.**, an American sculptor, born in Clark co., Ky., about 1810. He was of humble parentage, and while a boy found employment in building chimneys and other kinds of mason work. His education was restricted to a quarter's schooling, but he became an indefatigable reader of such books as came within his reach, spending his evenings over them by the light of a wood fire. In 1830 he entered a stone cutter's establishment in Lexington. By degrees he was induced to attempt modelling busts in clay, and succeeded in obtaining good likenesses of many influential persons in Lexington and elsewhere in the West. Among others, Gen. Jackson and Cassius M. Clay sat to him, and the latter gave him his first commission for a bust in marble. The work when completed proved so satisfactory, that the artist was commissioned by the "Ladies' Clay Association" of Virginia to execute a marble statue of Henry Clay. He commenced his model from the life in 1846, and after 8 years' labor upon it shipped it to Italy to be executed there in marble. He reached Florence in the latter part of 1849, and after waiting a whole year for the arrival of his model, which had been lost by shipwreck in the bay of Biscay, was obliged to send to Lexington for a duplicate. This and other delays protracted the completion of the work for several years, and it was not until Aug. 29, 1859, that the statue was shipped for the United States. In the interim Mr. Hart had executed many busts of eminent men and some ideal works. He is now engaged upon a colossal bronze statue of Henry Clay for the city of New Orleans.

**HART, JOHN**, a signer of the declaration of American independence, born in Hopewell, N. J., died there, at an advanced age, in 1780. The son of a farmer, he passed the earlier part of his life on his estate, and, being frequently elected to the colonial assembly, was prominent

especially in the legislation for local improvements. In 1774 he was chosen to the general congress at Philadelphia, where he was noted for his sound judgment and inflexible determination; he was reelected in the two following years, and signed the declaration of independence with peculiar zeal. New Jersey was soon invaded by the British army, the estate of Mr. Hart was devastated, and special exertions were made to take him prisoner. He fled from his family and wandered through the woods from cottage to cottage and from cave to cave, constantly hunted by his enemies, so that he never ventured to sleep twice in the same house. The capture of the Hessians by Washington allowed him to return to his estate, on which he passed the remainder of his life.

HART, SOLOMON ALEXANDER, an English painter of history and *genre*, born in Plymouth in April, 1806. He commenced his career by painting miniatures, but in 1828 turned his attention to historical subjects, and at once achieved a reputation by some scenes from the Jewish ceremonial, which his Jewish origin enabled him to treat *con amore*. He next painted scenes from Scott and Shakespeare and the romantic episodes of history, and again, between 1845 and 1850, recurred to Jewish subjects. He has also shown a strong partiality for subjects illustrating the ceremonials of the Roman Catholic church. He possesses great technical power and a feeling for the picturesque, and his works are popular. In 1840 he became an academician, and in 1854 succeeded Mr. Leslie as professor of painting in the royal academy.

HART, WILLIAM, an American painter, born in Paisley, Scotland, in 1828. Emigrating with his parents to the United States in 1831, he settled in Albany, and in a few years was apprenticed to Messrs. Eaton and Gilbert, coach makers, in Troy, by whom he was employed to paint the panels of coaches. He subsequently painted landscapes, portraits, and even window shades. Since 1848 he has been a regular exhibitor at the national academy of design, of which in 1858 he was elected an academician, having for 10 years previous been an associate. He has for some years been a resident of New York.—JAMES M., brother of the preceding, and a landscape painter, born in Kilmarnock, Ayrshire, Scotland, in 1828, also commenced life as a coach maker, and like his brother was induced by a natural taste for art to adopt the profession of a landscape painter. He went in 1851 to Düsseldorf, where he spent nearly a year under the instruction of Schirmer. He returned to Albany in 1852, and in 1856 removed to New York. In 1857 he was elected an associate of the academy of design, and in 1859 an academician.

HARTE, WALTER, an English author, born about 1700, died in Bath in 1774. He was educated at Oxford, took orders, and, after establishing a reputation as a preacher, became vice-principal of St. Mary's hall, Oxford. He travelled some years on the continent as tutor

to the son of Lord Chesterfield, and was afterward appointed canon of Windsor. He early formed an intimacy with Pope, whose style he imitated, and by whom he was aided in some of his compositions. In 1727 he published a volume of "Poems on Several Occasions;" in 1730 an "Essay on Satire," in 1735 on "Reason," and in 1764 on "Husbandry," the last an elegant and valuable work. But his principal production is the "History of the Life of Gustavus Adolphus" (2 vols. 4to., London, 1759; 2 vols. 8vo., corrected and improved, 1763; new ed. 1807), which was translated into German, with notes, by J. G. Böhme.

HARTFORD, a N. co. of Conn., bordering on Mass., divided into 2 unequal parts by the Connecticut river, and watered by Farmington, Mill, Podunk, Scantic, and other rivers; area, 750 sq. m.; pop. in 1850, 69,967. The surface is much diversified, part of the river valleys being alluvial and subject to inundation, while other portions of the county are hilly and even mountainous. Most of the soil is fertile and highly cultivated; the E. part is famous for excellent dairy farms. The productions in 1850 were 381,744 bushels of Indian corn, 210,954 of oats, 150,031 of rye, 5,260 of wheat, 490,387 of potatoes, 87,888 of buckwheat, 80,817 tons of hay, 1,071,486 lbs. of butter, 1,182,114 of tobacco, and 65,503 of wool. There were 19 grist mills, 7 iron founderies, 17 manufactories of woollens, 12 of cottons, 1 of edge tools, 2 of carpets, 11 of clocks, 18 newspaper offices, 114 churches, and 15,892 pupils attending public schools. The Connecticut river is navigable by sloops to Hartford, and by small steamboats through the county, which is also intersected by the New Haven, Hartford, and Springfield, the Hartford, Providence, and Fishkill, the New Haven and Northampton, the Middletown branch, and the Collinsville branch railroads. Organized in 1666. Capital, Hartford.

HARTFORD, a city, seat of justice of Hartford co., and semi-capital of Conn., situated on the W. bank of the Connecticut river, at the head of sloop navigation, 50 m. from Long Island sound, in lat. 41° 45' 59" N., long. 72° 40' 45" W., extending about two miles N. and S., and more than a mile westward from the river. By railroad it is 86 m. N. N. E. from New Haven, 111 m. N. E. from New York, and 124 m. W. S. W. from Boston. The population of the city, including the township, in 1810, was 6,003; in 1820, 9,617; 1830, 9,789; 1840, 12,793; 1850, 17,066; in 1855, of the city alone, 24,024; in 1859, estimated at 32,000. The legislature meets here and at New Haven alternately, the odd years at Hartford, and the even years at New Haven. The state offices and records are kept at Hartford. Hartford contains 163 streets and avenues, part of them running nearly parallel to the river, and others crossing them E. and W. The main street, which extends from N. to S. quite through the city, is the great thoroughfare, and the seat of the principal retail trade. It is broad and nearly straight, and for more than a mile pre-



sents an almost unbroken range of brick and stone edifices, many of which are elegant. On this street are the principal public buildings and churches, some of which are models of their kind. State and Commerce streets are also the seats of a large and active business, and are well built. Asylum street, extending W. to the railroad depot, is filled compactly by large brick and freestone edifices, and is the seat of a very extensive and heavy business, chiefly in cotton and woollen fabrics. In the outskirts of the city are many tasteful and elegant residences; and the city, as a whole, is exceedingly well built, exhibiting a large number of substantial and beautiful edifices, and more imposing and elaborate architecture than most cities of its size in the country. The state house, erected in 1793, is a handsome Doric edifice containing the legislative apartments and several law courts. The city hall, in the Grecian style, the Wadsworth Athenæum, a handsome Gothic building of granite, containing the rooms and library of the Connecticut historical society and of the young men's institute, the arsenal, and the railroad depot, of brown stone, are among the finest of the other public edifices. Hartford has 22 churches (1 African, 3 Baptist, 6 Congregational, 4 Episcopal, 1 Free Methodist, 1 Jewish, 2 Methodist, 1 Presbyterian, 1 Roman Catholic, 1 Second Advent, 1 Unitarian, and 1 Universalist), and 8 or 4 other churches have recently been organized, that have not as yet erected buildings. Hartford is also the seat of the American deaf and dumb asylum and an institution for the insane. The main building of the deaf and dumb asylum is 180 feet by 50, and 4 stories high. (See DEAF AND DUMB.) The retreat for the insane, founded in 1822, is situated on a commanding eminence just outside the city, surrounded by about 17 acres of ground pleasantly laid out in gardens and walks. The main edifice is of freestone plastered over with cement. It has over 200 patients, and since its opening has received over 8,000, of whom 1,600 have recovered, and 1,200 have improved. Trinity college, founded in 1825 under the direction of the Protestant Episcopal church, and originally called Washington college, has 16 professors and tutors, about 60 students, 500 alumni, and a library of 18,500 volumes. The buildings are of stone, and comprise 8 halls, called respectively Seabury, Jarvis, and Brownell, thickly encompassed by shade trees. There are two large female seminaries, a high school, a grammar school, 5 district schools having large and commodious edifices, a Roman Catholic school with 600 pupils, an African school, and a Hebrew and English school. The whole number of school children, of legal age, in the town and city, in 1859, was 4,937, of whom the average attendance at school, in winter, was 2,544, and in summer 2,557; amount received from school fund, \$6,838; from other funds, \$7,582; from town tax, \$10,804; expended within the year for teachers' salaries, \$18,178. There is a hospital, and the sisters of mercy have a convent,

an orphan asylum with 20 inmates, and a female academy with 55 pupils. The newspaper press comprises 10 or 12 publications, 2 or 3 of which are issued daily. There are in Hartford 12 banks, with an aggregate capital of nearly \$8,000,000; 10 fire insurance companies, with a capital of \$4,500,000; 5 life insurance companies, capital over \$4,000,000; and 6 banks for savings, some of which are connected with building associations. There are also 82 other organized companies of various kinds, with an aggregate capital of about \$7,000,000. The Hartford, New Haven, and Springfield railroad connects Hartford with the North and South; and the Providence, Hartford, and Fishkill, with the East and West. The united capital of these two roads is over \$7,000,000. Three lines of daily steamboats, 8 lines of steam packets, 4 lines of freight boats, and 4 lines of sailing packets ply up and down the Connecticut river constantly, beside many other vessels that cannot well be classified. In the line to Elizabethport and Philadelphia alone there are 74 vessels of various sizes. Sixteen different expresses carry packages to and from the city. Ten lines of stages and 4 lines of omnibuses connect the city in its various parts, and with the adjoining towns and villages. Hartford is surrounded by a large number of flourishing country towns, with which it has an active trade. Its banking business is large and profitable. Its life and fire insurance extends to every part of the country, and its income from this source is proportionally far greater than that of any other city of the United States. It carries on an extensive wholesale trade with the South and West. The tobacco crop of the immediate vicinity, most of which is sold here, is raising up a new and profitable department of business. Silk manufacturing is carried on extensively. A large carpet company, a linen and thread company, several coal and mining companies, two large companies for manufacturing silver-plated ware, one rifle company, one arms manufacturing company, several large iron works and foundries, and Colt's great pistol factory, with a capital of \$1,200,000, its works and grounds covering 128 acres diked in from the river, and its operations giving support directly or indirectly to thousands, all contribute to the prosperity of the place. Book publishing is carried on to a considerable extent. The value of manufactures for the year ending June 1, 1850, as given in the census returns, was \$3,619,389; in 1855 it was estimated at \$4,500,000, and in 1859 was probably between \$5,000,000 and \$6,000,000. The city is lighted with gas, and bountifully supplied with water brought from the Connecticut river at an expense of about \$400,000, and conducted through 24 miles of pipes to every part of the city. A bridge over the Connecticut 1,000 feet long, which cost \$125,000, connects the city with East Hartford; and 6 other bridges, 3 of stone, span the Little river in various parts of the city. The central park, which is beautifully located S. of the railroad depot,

contains 46 acres, and, though not fully completed, had cost up to Oct. 1859, about \$150,000. The proper city expenses in 1850 were \$18,002; in 1855, \$36,183; and in 1859, \$64,089, the total expenses for the year being \$198,057. The total funded debt of the city is \$975,000. The grand tax list of Hartford, at 3 per cent., was in 1800, \$100,000; in 1820, \$139,463; in 1840, \$256,315; in 1850, \$385,590; in 1855, \$563,592; and in 1858, \$657,470. In 1855 there were in the city 692 births, 299 deaths, and 281 marriages; in 1858, 872 births, 322 deaths, and 293 marriages. There are 5 cemeteries, 2 of which are disused. There are 5 engine companies, having 6 engines; 4 hose carriages with 2 companies; one hook and ladder, and one sack and bucket company; 4,500 feet of hose; 16 reservoirs, and 126 water hydrants; and some 400 men in the department. There are 7 public halls, and a library connected with the young men's institute containing 10,000 volumes. The city is divided into 6 election districts, or wards. The municipal government is vested in a mayor elected for 2 years, and 6 aldermen and 24 councilmen elected annually.—Hartford was first settled in 1635 by emigrants from Newtown (now Cambridge), Mass., and from Dorchester and Watertown, many of whom had come originally from Braintree, England. (See *CONNECTICUT*, vol. v. p. 621.) The present locality of Hartford was called by the Indians Suckiaug. The first settlers named it Newtown; but in 1636 it was formally called Hartford, after Hartford, now Hertford, England, the birthplace of the Rev. Samuel Stone, one of the first pastors of the settlement. A deed of the land was originally given by Sunockuassen, or Sequassen, sachem of the Suckiaug tribe; but this being lost, the settlers repurchased the land from the Indians, taking a new deed in 1670. In 1683 the Dutch had erected a fort on Dutch Point, at the confluence of the Little and Connecticut rivers, within the present limits of Hartford; but in 1654 they were dispossessed by an act of the general court, and thus the new colony came entirely into the hands of the English. Among the early settlers were a number who had been persons of eminence and affluence in England, and who were held in high honor through all the New England settlements, many of whom were founders of families yet prominent in the city. The first town organization admitted inhabitants, and even temporary residents, only by vote of the town meeting. The officers were townsmen, corresponding to the present selectmen, but with larger authority, the justices of a town court, constable, town clerk, orrier, fence viewers, chimney viewers, and highway surveyors, to whom, after a little while, were added grand jurors, and a gaoler. There was a public market semi-weekly, and a public fair twice every year. The first town meeting was held in 1635, and the first general court of Connecticut in 1636. The first church came ready organized from Cambridge, with its pastors

Hooker and Stone; and its first house of worship was erected in 1638, Mr. Hooker's barn having served as a place of meeting up to that time. In 1649 the old church was given by the town to Mrs. Hooker, and a new one built. The first war was the Pequot war in 1637, for which Hartford contributed 42 out of 90 men, including commander and chaplain, beside a large share of provisions, equipments, &c. In 1639 was completed their written constitution, the first ever formed in America, and which embodies the main points of all the subsequent state constitutions, and of the federal constitution. A school was in operation in 1638, and in 1643 £16 a year was voted to the teacher first named in the town records. Soon after this a movement was made to found colleges both at Hartford and New Haven, but the matter was dropped lest Harvard should be weakened, that institution being thought sufficient at the time for all the colonies. A house of correction was in operation in 1640; the first inn was ordered by the general court, and established in 1644. In 1650 the first code of laws was drawn up, chiefly by Roger Ludlow, which reduced the number of capital offenses from 160, under English law, to 15. In 1657 Gov. Hopkins left £1,000 chiefly for the endowment of the grammar school, which is still in existence as the classical department of the high school. In 1687 the independent spirit of the colony was shown by their quiet but determined resistance to Andros, in his attempt to take away the charter of 1682, when the lights in the council chamber were all in an instant extinguished, and the charter seized and carried off in the dark, and hid in the famous "charter oak." In 1764 the first printing office was set up by Thomas Green. In 1775 a patriotic and enterprising committee met and made arrangements for raising men and money, which resulted in the taking of Ticonderoga. In 1784 the city was incorporated; in 1792 the first bank and first charitable society were established. In 1857 Mr. David Watkinson bequeathed the sum of \$100,000 for the establishment of a free library, beside leaving \$20,000 to the orphan asylum and \$40,000 to the hospital.

**HARTFORD CONVENTION**, an assemblage of delegates from the New England states which met at Hartford, Dec. 15, 1814. The war between the United States and Great Britain, which began in 1812, was from the first distasteful to the majority of the people of New England, who regarded it as unnecessary and impolitic, and who had suffered from it immense losses by the destruction of their commerce and their fisheries. They regarded the war as a mere party measure of the democrats, and as federalists they had earnestly and persistently opposed it. In Feb. 1814, a committee of the Massachusetts legislature made a report on the subject of public affairs, in which they stated that in their opinion the constitution of the United States had been violated by the federal government, and that still worse measures were

likely to follow; and they suggested the appointment of delegates to meet such as might be appointed by the legislatures of other states "for the purpose of devising proper measures to procure the united efforts of the commercial states to obtain such amendments or explanations of the constitution as will secure them from future evils." The defence of the New England coast was neglected by the federal government, and the British were beginning to attack it with vigor. Stonington in Connecticut was bombarded, Castine and all Maine east of the Penobscot taken possession of, while a rumor spread that Massachusetts was to be invaded by a formidable force. Another committee of the Massachusetts legislature, of which Harrison Gray Otis was chairman, reported in Oct. 1814, that in the position in which that state stood no choice was left her between submission to the enemy, which was not to be thought of, and the appropriation to her own defence of those revenues derived from her people which the general government had hitherto thought proper to expend elsewhere. The committee also recommended a convention of the New England states; and their report being adopted by the legislature by a vote of three to one, a delegation of 12 men of the highest reputation, with George Cabot, William Prescott, and Harrison Gray Otis at their head, was appointed. A circular letter to the other New England states called upon them to meet in convention "to devise means of security and defence which may be consistent with the preservation of their resources from total ruin, and adapted to their local situation and mutual relations and habits, and not repugnant to their obligations as members of the Union." Connecticut and Rhode Island responded to this invitation, the former by appointing 7, and the latter 4 delegates. Two delegates appeared from New Hampshire, and one from Vermont, not sent by these states, but by separate counties. The convention met Dec. 15, and chose George Cabot president and Theodore Dwight secretary. For 20 days the convention sat with closed doors, and on their adjournment embodied the result of their deliberations in a report addressed to the legislatures which they represented. This manifesto was moderate in tone and patriotic in sentiment, expressing strong affection for the Union and the greatest aversion to violent or unconstitutional opposition to legal authority. It pointed out, however, the dangers impending over New England from the alleged usurpations of the general government and from the foreign enemy. In the power over the militia claimed for the general government; in the filling up the ranks of the regular army by conscription; in authorizing the enlistment of minors without the consent of their parents or guardians, thus invalidating contracts, the report maintained that the federal constitution had been disregarded in a way that demanded from the individual states firm and decided opposition. The convention re-

commended to the legislatures of the states for which it spoke, the adoption of such measures as might be necessary effectually to protect their citizens from the operation of the acts passed by congress containing provisions subjecting the militia and other persons to forcible drafts, conscriptions, or impressments not authorized by the constitution of the United States. It recommended also an immediate application to the federal government by the New England states for authority to combine their forces for their defence against the British, and to appropriate for the same purpose a reasonable amount of the taxes levied upon them. Finally, it proposed several amendments to the federal constitution, among which were, the basing representation on free population; making the president ineligible for a second term; disqualifying persons of foreign birth to hold office; limiting embargoes to 60 days; requiring a two-thirds vote in congress to admit new states; to interdict commercial intercourse, to declare war, or to authorize hostilities except in case of invasion. These questions had arisen during the hostilities with Great Britain, and the news of the negotiation of the treaty of peace at Ghent, which arrived soon after the adjournment of the convention, put a practical stop to their discussion. Congress, however, which was then in session, settled some of them by an act regulating the employment of state troops by the federal government in a satisfactory manner.—The holding of the Hartford convention and its supposed treasonable designs caused a great outcry from the democratic party, and excited much alarm and apprehension at Washington. The government stationed Major Jessup, a Kentucky officer of distinction, at Hartford with a regiment of troops to repress any sudden outbreak; but after the most careful investigation, this officer reported to his superiors at Washington that the convention would confine itself to complaints, remonstrances, and an address to the people, and that there was no reason to apprehend any treasonable action. The state department, however, had a correspondent who pretended to be in the confidence of the late British consul at Boston, and to have learned from him or from his papers the existence of a committee of New England royalists, who intended to establish the kingdom of New England with the duke of Kent as its sovereign. The chief clerk of the state department was sent to Boston to investigate this matter, but could discover no trace of the pretended committee. The imputation of treasonable designs to the Hartford convention continued until a very recent period, and resulted in excluding from political power in the nation almost every man implicated in its doings. It was also one of the causes which destroyed the federal party. It is now, however, almost universally conceded that the Hartford convention was *guiltless* of any designs which could justly be considered treasonable.

HARTLEPOOL, a town and seaport of Dur-

ham, England, on a small peninsula near the mouth of the river Tees, 17 m. S. E. from the city of Durham, with which it is connected by railway; pop. in 1851, 9,503. It has ship yards, iron and brass foundries, anchor and chain works, a cement manufactory, and extensive docks. The harbor has been considerably enlarged. On Dec. 31, 1856, the registered shipping of the port comprised 186 vessels of 40,020 tons. The entrances during the year were 2,234 vessels of 314,560 tons, and the clearances 8,172 vessels of 1,182,521 tons. This town is much frequented in the summer for sea-bathing.

**HARTLEY, DAVID**, an English philosopher, born in Armley, Yorkshire, Aug. 30, 1705, died in Bath, Aug. 25, 1757. He was educated at Jesus college, Cambridge, of which he became a fellow, was destined to the church, but had scruples about subscribing the XXXIX. articles, and therefore studied medicine. In this profession he practised with success at Newark, Bury St. Edmund's, London, and Bath. All records agree in extolling his personal character. His society was sought by the most distinguished literary men of his time, and among those whose friendship he enjoyed were Bishops Law, Butler, Warburton, and Hoadley, Dr. Jortin, the poet Young, and the historian Hooke. "From his earliest youth," writes one of his children, "his mental ambition was preoccupied by pursuits of science. His hours of amusement were likewise bestowed upon objects of taste and sentiment. Music, poetry, and history were his favorite recreations. His natural temper was gay, cheerful, and sociable. The virtuous principles which are instilled in his works were the invariable and decided principles of his life and conduct." The composition of his great work, "Observations on Man, his Frame, his Duty, and his Expectations," he began at the age of 25, and it was published after a labor of 16 years (3 vols., London, 1749). His theory of sensation, grounded on an anatomical inspection of the nervous system, is historically curious as perhaps the first attempt to explain psychological phenomena on physiological principles. According to him, the white medullary substance of the brain, spinal marrow, and the nerves proceeding from them, is the immediate instrument of sensation and motion. External objects excite vibrations in the medullary cord, which are continued by a certain elastic ether. The objections to the theory are, first, that it is merely hypothetical, and secondly, that, even if the vibratory movements were proved to exist, it explains nothing; there would be the same chasm as ever between the material condition of sensation and the ultimate mental effect. Connected with this theory, however, are other doctrines, especially that of association, which gave to Dr. Hartley a reputation as one of the most ingenious metaphysicians of the 18th century. When a sensation has been frequently experienced, the vibratory movement from which it arises acquires a tendency to repeat itself spontaneously. Ideas are but

these repetitions or relics of sensation, and in their turn recall other ideas. Thus the sight of an apple recalls an idea of its taste, and this idea recalls other ideas which may have been before experienced at the same time. By the development of the law of association, and chiefly by the law of transference, he accounts for all the phenomena of the mental constitution. In many cases, the idea which is the link of association between two other ideas comes to be disregarded, though the association itself remains. Thus the idea of money is connected with that of pleasure by the conveniences which wealth may supply; but the miser takes delight in money without thinking of these conveniences. In this way Hartley accounts for almost all the human emotions and passions. The filial affection springs from the transference of the pleasure received from parental kindness to the parent itself; the patriotic affections, from transferring the advantages of society to the country which affords them; and the moral and religious affections, from the transference of the pleasures connected with pious and virtuous conduct to a moral law of action or to the supreme lawgiver. So little dependent is Hartley's doctrine of association on that of vibrations, that Dr. Priestley in his abridgment of the "Observations" (London, 1775) omits the latter hypothesis altogether. An edition of the work, by his son, with notes from the German of H. A. Pistorius, was published in 1791 (3 vols., London).—**DAVID**, son of the preceding, born in 1729, died in Bath in 1818. As member of parliament for Kingston-upon-Hull, he steadily opposed the war with the American colonies. He was one of the plenipotentiaries appointed to treat at Paris with Dr. Franklin, in whose correspondence, published in 1817, some of his letters appear. He was an early promoter of the abolition of the slave trade, and exhibited his scientific knowledge in several useful inventions.

**HARTMANN, MORITZ**, a German poet and politician, born in Bohemia in 1821. He studied at the universities of Prague and Vienna. Having become noted as a liberal, he found himself obliged to leave his native country, and reside for some time in France and Belgium. In 1847 he returned to Austria, and was soon subjected to a judicial examination, which was abruptly concluded by the events of March, 1848, when he became a leader of the German democrats in Prague, took part in the provincial parliament in Frankfort, and afterward in the regular parliament as deputy from Leitmeritz. In Oct. 1849, he went with Froebel and Robert Blum to Vienna, but left the city before the final defeat of his party, and fled to England. He lived from 1850 to 1858 in Paris, and in 1854 was correspondent from the Danubian principalities for the *Kölnische Zeitung*, but left the country when the Austrians entered it, for France. Since 1859 he has lived in Hamburg. His principal works are: *Kelch und Schwert* (Leipsic, 1845); *Neuere Gedichte* (1847); *Reimchronik des Pfaffen Mau-*

*ricius* (Frankfort, 1849); *Der Krieg um den Wald* (1850); *Adam und Eva* (Leipzig, 1851); *Tagebuch aus der Provence und Languedoc* (1853).

HARTSHORN, SPIRITS OF. See AMMONIA.

HARTSOEKER, NICOLAAS, a Dutch mathematician and natural philosopher, born in Gouda, March 26, 1656, died Dec. 10, 1725. He was intended for the church, but was induced by his taste for mathematics to give his attention almost exclusively to scientific pursuits. One of his earliest inventions was an improved form of object glasses for microscopes, the increased power obtained by which enabled him to discover animalcules in the animal fluids, on which a new doctrine of generation was formed. Subsequently in Paris he succeeded in manufacturing object glasses for telescopes superior to any previously made. An account of these discoveries was published in the *Journal des savants* of Paris by Huyghens, and in 1694 Hartsoeker published in the same city his *Essai de dioptrique*, followed in 1696 by his *Principes de physique*. He afterward returned to Holland, and while living there was introduced to the czar Peter, who was so charmed with his conversation that he endeavored, but without success, to induce him to settle in St. Petersburg. After filling for several years the professorship of mathematics in Düsseldorf, he retired to Utrecht. One of his last works was his *Recueil de plusieurs pièces de physique*, in which the system of Newton was assailed with more violence than force. Previous to this he published his lectures under the title of *Conjectures physiques* (Amsterdam, 1706-'8), and a number of other works, many of which were of a controversial nature, his taste for dispute having amounted to a disease, and having estranged him from many of his contemporaries.

HARTZ (Germ. *Hars*, or *Haregebirge*), the most north-western group of mountains in Germany, between lat. 51° 35' and 51° 57' N. and long. 10° 10' and 11° 30' E. They separate the waters of the Weser from those of the Elbe. With their spurs they cover an irregular area of about 1,850 sq. m., with a population of about 70,000, contained in some 40 towns and villages. Of this territory, about 450 sq. m. belong to Hanover, 500 to Brunswick, 800 to Prussia, and 100 to Anhalt-Bernberg. Their principal axis, which extends in a direction about W. N. W., E. S. E., is not far from 60 m. in length. The width of this main chain, as from Wernigerode to Ilfeld, is about 18 m. The highest summit is the Brocken, a mountain of feldspathic granite, which by its easy decomposition has caused the mountain to assume a rounded graceful form. It rises to the height of 8,740 feet, and overlooks all the surrounding country. The Rosstrappe stands near by in the same group, and is of somewhat inferior elevation to the Brocken, from which it is separated by formations of argillaceous slates and the lower limestones. It is composed of granite in which quartz predominates, giving to the rock a more indestructible character and to the mountain a

more rugged aspect than that of the Brocken. The Rammelsberg is a mountain of argillaceous slate and the older sandstones, reaching the height of 1,280 feet above the plain near the town of Goslar. The district comprising these mountains is principally made up of granitic rocks, which form the highest summits, and of gneiss, argillaceous slates, and metamorphic limestones and sandstones, which are grouped around, and penetrated by, the granites. Various rocks of the upper secondary, from the *gris bigarré* or new red sandstone to the chalk, repose unconformably upon the older formation around their marginal outcrop. The more elevated portions of the district are rough and dreary, with a sterile soil and a climate so cold that a fire is necessary for comfort throughout nearly all the year. The valleys are more fertile, and the country surrounding the mountain produces abundantly the fruits required for the support of the mining population. The mines, chiefly of lead, silver, copper, and iron, constitute the only riches of this mountainous region. For many centuries they have been industriously worked, and the business connected with them gives constant employment to about 60,000 persons. The ores are found of great variety, but are not remarkable for their richness; on the contrary, it is only by the great skill applied to their extraction from the mines and the separation of their metallic ingredients, that the working of them has been so long sustained. The mines belong chiefly to the states of Hanover and Brunswick; the former possessing those at Clausthal and Andreasberg, in the upper Hartz, and the latter a portion of those in the Rammelsberg near Goslar. Those of the eastern Hartz are in the territory of Anhalt-Bernberg. The Rammelsberg mines were opened in the year 968—those of the upper Hartz mostly in the 16th and 17th centuries; and the chief towns upon their sites, as those above named and Altenau, Zellerfeld, Lautenthal, Wildemann, and Grund, were founded in consequence of the discoveries of the mineral resources beneath the surface. These mining towns (*Bergstädte*) are entitled to special privileges, and no business is conducted in them but what is connected with mining and metallurgy. Clausthal is the head-quarters of these operations. The council which has general charge of the mines meets here, and here are a mint and a school of mines, the latter furnished with a fine collection of minerals and models of mining and other machinery. The mines of the upper Hartz belong either to the group at Clausthal or that of Andreasberg. In the former the veins follow several lines of fracture in an E. and W. direction. One passes through the city of Zellerfeld, extending from Wildemann to Clausthal, a distance of 3 m. They produce argentiferous galena, copper pyrites, and blende in a quartzose gangue, intermixed with calcareous spar, brown spar, heavy spar, and spathic iron. They are remarkable for spreading out in thin branches through a

great breadth of rock, and at Clausthal these strings are profitably explored throughout a width of 800 feet. The famous drainage level of these mines is noticed in the article ADIR.—The mines and city of Andreasberg are situated upon the steep slope of a mountain of argillaceous and silicious slates. The whole area occupied by the former is hardly a mile square. Rich silver ores are found here in small veins, as the antimonial sulphuret of silver and ruby red silver of the dark and light varieties. Argentiferous galena is also a product of these mines. At this locality is found the deepest mine in the world. It is upon an argentiferous vein, which has been followed to the depth of more than 2,520 feet from the surface, the last 800 feet since about the year 1820. The richest ores are found in courses which extend only about 100 feet in length on the vein. The best of these was struck at a depth of about 2,160 feet, and has continued highly productive to the greatest depth named. The Rammelsberg mines produce similar ores to those of the upper Hartz district. In 1886 their products were: gold, 7 lbs.; silver, 2,509 lbs.; lead and litharge, 567 tons; copper, 227 tons; and zinc, 6 tons. On account of the extreme hardness of some of the vein stones of these mines, it has been the practice, instead of attempting to drill the rock for blasting, to build a large fire against the face of the vein, and leave this to act upon the ingredients, like the arsenic and sulphur, which may be volatilized, and thus cause the mass to be easily attacked and broken down to some extent. It has been noticed in one instance that to drill a hole 4 inches deep required 88 hours' work, dulling 201 drills and rendering unfit for use 152 more, which were only steel-pointed. The ore that proved so hard was principally composed of copper and iron pyrites. As the fire has little effect near the floor of the workings, it was found necessary to blast this portion at treble the expense incurred in removing the same quantity of material by fire.—Various other ores have been obtained in the Hartz beside those named. Iron mines have been extensively worked; ores of antimony have been produced to some extent, as also those of cobalt and manganese. Gold has been obtained in sufficient quantity in the principality of Anhalt to furnish several medals, which were struck off with the inscription: *Ex Auro Anhaltino*. The rare metal selenium has also been extracted in some quantity from the seleniuret of lead of the same district. The Mansfeld bituminous copper slates are singular ores of so low a percentage, that the copper pyrites disseminated through them is not visible, yet they have been long profitably worked in the lower Hartz. The annual production of the Hartz mines, not including that of the Rammelsberg, is probably not far from 5 lbs. of gold, 80,000 to 85,000 lbs. of silver, 5,000 to 6,000 tons of lead, 150 tons of copper, and 5,000 tons of iron.—The population of the upper and lower Hartz speak different dialects. The most

beautiful valleys are those of the Selke, Bode, and Ilse rivers. Beside the Brocken or Blocksberg, which plays an important part in the popular legends and fairy tales of Germany, and which is immortalized in Goethe's "Faust," there are many remarkable localities in the Hartz, as the Stauffenberg, with the ruins of the castle of Henry the Fowler, the castle of Falkenstein, the Alexisbad, &c. The Teufelsmühle, Rosstrappe, and the valley of the Bode are renowned for their fine and peculiar scenery; and two curious caves (Baumannshöhle and Bielhöhle) are interesting on account of the fossil bones which they contain.—See Specker, *Der Hartz, seine Ruinen und Sagen* (Berlin, 2d ed. 1857).

HARVARD, JOHN, the founder of Harvard college, born in England, probably in Middlesex, died in Charlestown, Mass., Sept. 24, 1638. He was entered as a pensioner at the university of Cambridge on 1628, was graduated B.A. in 1631-'2, and M.A. in 1635, and having emigrated to America was made a freeman of the colony of Massachusetts, Nov. 2, 1637. The following year, as appears from the town records, a portion of land was set off for him in Charlestown, where he exercised the ministry. In April, 1638, he was appointed one of a committee "to consider of some things tending toward a body of laws." These are the only particulars known of his life. His property at his death was worth about £1,600, one half of which he gave for the erection of the college which bears his name; but part of this bequest, we are told, was diverted from its original purpose. He also left to the college a library of more than 800 volumes, indicating in their selection the taste and skill of a scholar. A monument to his memory was erected in the burial ground of Charlestown by the alumni of the university, and inaugurated with an address by Edward Everett, Sept. 26, 1828.

HARVARD COLLEGE, the oldest and the most amply endowed of the literary and educational institutions of the United States, situated at Cambridge, 8 miles from Boston, Mass. Six years after the first settlement of this region by the English we find the following entry on their records, under date of Oct. 28, 1636: "The court agreed to give 400*l.* towards a schoole or college, whereof 200*l.* to be paid the next years, and 200*l.* when the work is finished, and the next court to appoint where, and what building." The next year the court ordered that the college should be at "Newetowne," and designated the governor and deputy governor, with 10 others, including the principal laymen and ministers of the colony, to have charge of the undertaking. Under date of March 13, 1639, we find the following record: "It is ordered, that the college agreed upon formerly to be built at Cambridge shall be called Harvard College." By the change of the name Newtown to Cambridge it was designed to honor the famous English university, of which some of the early settlers were graduates, and the name Harvard was given to the institution in recog-

nition of the liberal endowment of about £700 left by the will of the Rev. John Harvard in 1638. There is ground for doubting whether the original grant of £400 was ever actually paid. It is certain that the project for a college lay in abeyance until the bequest of Harvard, representing then 10 times its present value, at once initiated the necessary measures. In Oct. 1680, by another order of court: "The ferry between Boston and Charlestowne is granted to the college." The town of Cambridge gave several parcels of land, as did other public bodies and private individuals. The legislatures of the colony, province, and state of Massachusetts made grants, in early times regular ones annually, to pay the salary of the president, and to aid in the support of some one or two other officers or teachers in the college, as also occasional gifts for special purposes; while it chartered lotteries, the schemes of which had in view the obtaining of sums of money for building some of the older college halls. The last grant made to the college from the public treasury was in 1814. In the meanwhile, from the very first year of its existence down to the present time, the college has depended upon the generosity of private individuals. It has no funded property from the public treasury. All that it has ever received from that source would not build and endow a first class academy. Neither of the 4 professional schools attached to the college and constituting the university has ever been indebted to the state for a single dollar. The earliest private gifts begin with small sums of money, a font of types and other furniture of a printing press, little articles of silver, books, fat cattle, corn and meal, and patches of land. It is impossible to assign any sum of money as expressing the available property of the institution at the present day. No money value is set down on the treasurer's books for the lands, the 15 public buildings and the many dwelling houses, the library, apparatus, and works of art in possession of the college. The invested funds, given by individuals and for the most part appropriated to scientific purposes, exceed \$1,000,000. An impression prevails that the college is very rich, but this is not the case. Nearly all its funds have been bequeathed by individuals for specific uses, as for instance the endowment of professorships. The income of each bequest is rarely sufficient to answer its object, and as the deficiency has to be eked out from other sources, the treasury is actually under a constant strait. A class of pupils began a course of study in the college under Nathaniel Eaton, remembered for his severity, as soon as Harvard's bequest was made known. At first it was little better than an Indian school. Strenuous efforts were made to educate a few of the aborigines as teachers of their own race, but only one Indian was ever graduated. The first president of the institution was the Rev. Henry Dunster, who held the office from 1640 till 1654, when he was compelled to resign on account of his religious opinions, and was succeeded by

the Rev. Charles Chauncy, who died in office in 1672. In 1672 the library received a valuable addition by the bequest of Theophilus Gale. Increase Mather, noted in New England history, was president from 1685 to 1701. He secured from the crown, under the new colonial charter, the possession of the college and all its endowments, and administered its affairs with ability and success. The first degree of D.D. ever granted by the institution was conferred upon him in 1692. A few years later Harvard college received the first of a series of munificent gifts from the Hollis family, including some valuable books. In 1764 the library was destroyed by fire, and about 6,000 volumes were lost, including all Harvard's books except one, the oriental collection bequeathed by Dr. Lightfoot, and the Greek and Roman classics presented by Bishop Berkeley. Edward Everett was president of the college from 1846 to 1849, and was succeeded by Jared Sparks, who gave place in 1853 to the Rev. James Walker, D.D. President. Walker resigned in Oct. 1859, and was followed by the 20th who has held that office. In 1842, mainly through the efforts and liberality of Mr. Abbott Lawrence, the scientific department was established for those who wish to qualify themselves for practical pursuits without going through a regular classical course. The university buildings are 15 in number, 14 of which are situated in Cambridge, and one (the medical school) is in North Grove street, Boston. The principal halls are University hall, of granite, containing a chapel, lecture rooms, a dining room, &c.; Gore hall, in which is the library; Hulsea chapel; Divinity hall, &c. The buildings occupy about 14 acres of ground, which is tastefully laid out.—The external administration of the college, as provided for by its charter and by subsequent legislative enactments, is vested in two separate boards, viz., the president and fellows, and the overseers. The college being the first, and having been for a long period the only incorporated or chartered body in the colony, its first governing board has become familiarly known as by eminence "the corporation of Harvard college." It is composed of the president, five fellows, and the treasurer. With this board originate all nominations to office, as well for filling vacancies in its own body, as for professors, tutors, &c. The action of this board is subject to the approval of another board, called "the overseers of Harvard college." Various changes have from time to time been made in the organization of this board. The oversight of the college was by the charter committed to the Congregational ministers of the 16 adjoining towns, in connection with the magistrates of the colony. This provision was first modified as regards the residence of the ministers eligible for this office, and next as regards their denomination. Up to 1852 the board of overseers was composed of the governor and lieutenant governor, the council and senate, the speaker of the house of representatives, and the president and treasurer of the college, all *ex officio*, and of a per-

manent body of 80 persons, 15 of whom were laymen and 15 clergymen. The board then filled its own vacancies. All the members of the corporation and a large majority of the permanent part of the board of overseers were then ranked as belonging to one sect in religion, the Unitarian. As these gentlemen were also, with hardly an exception, educated persons, graduates of the college, sharing common views, conservative principles, and the same political sympathies, they rendered the administration of the institution obnoxious to some popular objections, as if it were in the hands of a clique or party in religion and sympathy. To bring about the change desired, a measure was proposed in the legislature by which 7 additional members to be chosen by the general court would have been added to the corporation. The president and fellows, by a memorial, succeeded in defeating the proposition as one aimed against their chartered rights. An alternative measure, which it is expected will as effectively, though indirectly, secure the end intended, was successfully carried through the legislature, and introduced a fundamental change in the constitution and the tenure of membership of the board of overseers. The senate and the council were to drop off, and the 80 permanent overseers, lay and clerical, were to retire in sections of 10 annually, for 8 years, the legislature supplying the vacancies. When this change was effected, 5 of the 80 non-official members of the board were to drop out of it year by year, and 5 new members were to be chosen by the legislature. Beside these 80 members thus chosen, and thus rotating in office, the following are *ex officio* members of the board: the governor and lieutenant governor of the commonwealth, the president of the senate, the speaker of the house of representatives, the secretary of the board of education, and the president and treasurer of the university. The president and fellows thought it wise to ratify the measure, and it remains to be proved how far the harmony of action which heretofore has characterized the relations of the two boards will be affected by the change in time to come. But the ratification of the measure has certainly greatly strengthened the claim of the state to supreme influence over the college. The state claims the institution on the ground that the colony of Massachusetts was its founder, and that having given to it a being and the first gifts to its treasury, it is entitled to the administration of all the accretions which from all sources have gathered around the original deposit. The institution is also especially and emphatically recognized in the constitution of the state. To this claim some reply, that though the first prompting or purpose having reference to the college is to be traced to the court of the colony, the private munificence of John Harvard actually gave the college its existence as well as its name, while ever since his time private bounties, gifts, and legacies have furnished it with 19 parts in 20 of all its means. The internal government of

the institution is administered by the faculty, composed of such of the college officers as are brought into immediate connection with the students by supervising their studies and conduct. Affiliated with the original academic foundation are the 4 professional schools of law, theology, medicine, and science. The president and fellows are trustees and administrators of all the funds of these separate schools (all of which are from private sources), and have the nomination of the professors in them; the overseers exercise over them the same functions as over the college proper; and in each of the schools is a separate faculty for its internal administration, the president of the college being a member of all the boards in the 4 schools. The number of actual graduates of the college, not including the alumni of its professional schools nor those who have received its honorary degrees, exceeds 7,000, of whom some 2,600 are living. The honors of the college are not bestowed lavishly, as the roll of those who have received them will be found on examination to be composed for the most part of the names of men who, in the distinctions which they have achieved, or in the way of achieving them, have shown themselves not unworthy of a place in the triennial catalogue of a university.—The course of study pursued within the college has been steadily modified according to the progressive standard of education recognized in the general republic of letters all the world over. Of late years the standard has been greatly raised, the curriculum has been extended, the principle of emulation has been largely employed, great thoroughness in philological exercises has been aimed after, some elective studies have been offered to meet the preferences of students, and means have been afforded for advancing in special pursuits those who develop a strong aptitude for them. The libraries of the university contain 128,400 volumes. A gymnasium has been erected and furnished to go into operation in 1859 for an aid to the physical training of students. The list of officers of instruction and government includes 88 professors and 18 tutors, proctors, &c., and the number of students in 1858-'9 was 780, of whom 409 were undergraduates, 811 attendants on the professional courses, and 10 resident graduates. The academical year is divided into 2 terms, with vacations of 7 weeks in July and August, and 6 weeks in January and February.

HARVEST FLY, a hemipterous insect, of the division *homoptera* (from having the wing covers of the same texture throughout), of the family *cicadada*, and genus *cicada* (Oliv.), improperly called locust in America. It has been known from remote antiquity, and is the *terris* of the Greeks, *cicada* of the Latins, *cigale* of the French, and *cicala* of the Italians. The harvest flies or cicadians have short antennae, conical, 6-jointed, and tipped with a little bristle; wings and wing covers in both sexes, inclined at the sides of the body; 3 joints in the tarsi; a hard skin; and in the female a piercer



lodged in a groove under the end of the body. The most remarkable is the genus *cicada*, improperly translated grasshopper, easily known by their broad heads; their large, convex, and brilliant eye on each side, and 3 simple eyes on the crown; their wings and the covers veined and transparent; and an elevation on the back part of the thorax in the form of an X. The males make a loud rattling sound by means of a kind of kettle-drum apparatus on each side of the base of the abdomen; this is covered by 2 large oval plates, and consists of a cavity containing plaited folds of a parchment-like membrane, transparent as glass; these are moved by muscular cords, whose alternate and very rapid contractions and relaxations produce a corresponding tension and looseness of the membranes and a consequent harsh rattling noise, heard to a considerable distance; the action is assisted by the rapid movements of the wings, and the sound is rendered more intense by the resonance of cavities within the body protected by valves. The piercer has 2 lateral plates toothed like a saw in the lower portion, and between them a spear-pointed borer. They have not the power of leaping like locusts and grasshoppers; the legs are short, and the anterior thighs are armed with 2 stout spines. In the perfect state they live only a few weeks, performing the work of reproduction and then dying; but in the larva state they are wingless and subterranean, living on the juices of roots, and passing a series of years in the ground. The *C. septendecim* (Linn.) is called the 17 years' locust from the prevalent belief that its life is prolonged to that extent in the imperfect state; undoubted testimony, both from popular and scientific sources, proves that these insects usually appear at intervals of 17 years, but accidental circumstances may accelerate or retard their progress to maturity; though they appear in some parts of the country probably every year, and indeed in all districts except northern New England and to the north of that, the lineal descendants of each swarm appear only every 17 years; the popular name of locust was doubtless derived from this fact of their appearance in large swarms after long intervals of time, like the locusts of the East. In the perfect state this harvest fly is of a black color, the anterior edge and principal veins of its transparent wings and covers being orange red; near the tips of the covers there is a dusky zigzag line in the form of the letter W, which by the superstitious is supposed to indicate approaching war; as the mark on the other wing would be inverted like the letter M, the two were supposed to announce a war with Mexico during their appearance in Louisiana in 1835, which however did not arise until some years after; the eyes are red, with metallic reflections; the rings of the body are edged with dull orange, and the legs are of the same color; the expanse of wings is from  $2\frac{1}{2}$  to  $3\frac{1}{2}$  inches. Though found upon almost all kinds of trees, except most evergreens, they prefer forests of oaks. The perfect insects emerge

from the ground from February to the middle of June, according to latitude and the warmth of the season; their numbers are often so great that the limbs are bent and broken by their weight, from 6 to 8 being sometimes seen on every leaf; the drumming sound is heard from morning to night, but most loudly between the hours of 12 and 2; when heard in the deep woods it has a tone of sadness, calculated to make the insect to the superstitious ear a harbinger of woe. They are not found in low alluvial lands, and a dry air is necessary for the perfection of the drumming. The males perform the act of reproduction and soon die; they present scarcely a trace of digestive apparatus and probably take no nourishment; the sexual system is fully developed on emergence from the ground, each of their 500 sperm cells containing about 1,000 spermatozoa. The females have each about 500 eggs, of about  $\frac{1}{8}$  of an inch in diameter, which when deposited are twice that size; their digestive system is complete, and the demand for food to develop the eggs must be satisfied during their longer life; the females are  $\frac{1}{2}$  smaller than the males. In order to deposit her eggs, the female clasps the smallest twig of a tree with her legs, and introduces the piercer to the pith obliquely and in the direction of the fibres, detaching little splinters by the lateral saws at one end to serve as a cover to the perforation; after boring a hole long enough for about 16 eggs, she introduces them in pairs side by side, but separated slightly by woody fibre, and standing obliquely upward; after making a nest and filling it in a space of 15 minutes, she makes others on suitable twigs until her stock is deposited; by this time incessant labor has so weakened her that she drops exhausted from the tree, and soon dies. The eggs are pearl white, very delicate, and are hatched in from 3 to 6 weeks, according to favoring circumstances. The twigs pierced by the insect wither and fall to the ground, either on account of the wound or because such are selected as would soon fall from natural causes; in this way many of the larvae reach the earth, but most are developed on the trees; the emerging larva is about  $\frac{1}{8}$  of an inch long, hairy and grub-like, of a yellowish white color, with 6 legs, the first of which are strong like lobster claws, and spiny beneath; there are rudiments of wings, or little prominences on the shoulders, and under the breast a long sucking ciliated tube with a central tongue. Active on leaving the egg, they in a few moments drop to the ground, and at once bury themselves beneath the surface by means of their fore feet; they follow the roots of plants, to which they attach themselves, perforating them with their beaks and sucking their juices; they do not descend very deeply into the soil, and change but little during their long subterranean abode except in size and in development of the rudimentary wings. As the time of transformation approaches, they gradually advance toward the surface in cylindrical and circuitous passages,

about  $\frac{1}{2}$  inch in diameter and from a depth of one or two feet; now become pupæ, they gradually acquire strength for their final change; they leave the earth in a warm night and ascend trees, on which in a short time the pupa skin bursts on the back, and the perfect cicada comes forth. The ground is sometimes riddled like a honeycomb by their numbers, which in about 6 weeks are all dead. Did these insects appear every year or two in the same locality, fruit and forest trees would suffer much from their attacks, even though they only rob roots of juices; but fortunately they appear only at long intervals, and their eggs are eaten from the beginning by ants and other insects; the larvæ are also devoured by the same insects, by birds (especially woodpeckers), by toads and frogs, and other reptiles; when turned up by the plough, blackbirds and hogs eat great numbers of them; many perish in their wooden prison, and others are killed by the fall from the trees; as they generally occur in swarms containing about the same number at each period, of course only a small proportion of the eggs laid can ever produce the perfect insect, probably not more than 2 of the deposit of each female arriving at the mature state.—Another American harvest fly is the dog-day cicada (*C. canicularis*, Harris), so called from the time of its first appearance on July 25; it is about  $1\frac{1}{2}$  inches long, with a spread of 8 inches; it is black above, with a powdery white substance on the under parts, and with green markings on the head, thorax, wing covers, and legs. The frosted harvest fly (*C. pruinosus*, Say) of the middle states is 2 inches long, with white spots on the abdomen and sides. These and several other species have the drumming apparatus, which is always integumental, having no relation to the respiratory system; the sound in some of the large southern individuals continues for nearly a minute. Other harvest flies of the same family, but principally of the genus *membracis* (Fabr.), have only 2 eyelets; they are not furnished with a musical apparatus, but have the faculty of leaping a distance of 5 or 6 feet; they are more properly called tree-hoppers. For full details and references in regard to the American cicadas, the reader may consult Dr. Harris's work on "Insects Injurious to Vegetation."—The European species do not pass more than a year in their subterranean abode. The *C. plebeia* (Linn.) is the largest, and is probably the one sung by poets of antiquity, especially by Anacreon and Virgil. These insects were so highly esteemed by the Athenians that they wore golden images of them in their hair; they, however, were also esteemed as food, just before the conclusion of the nymph state; they are said to be sold in South American markets, and, freed from the head, wings, and legs, to be roasted and ground into flour. More than 60 species have been described, spread over almost all the warm regions of the earth. The *C. plebeia* is black, with reddish spots on the thorax and wing covers. The *C. hematodes* is also

black, with the front of the thorax and legs spotted. The *C. ornis*, common in central and southern Europe, is about an inch long, yellowish, mixed with black; by their wounding certain species of ash tree, a saccharine fluid escapes, which, dried and hardened, is used in medicine as manna; this hint from the insect has been taken advantage of by man, who, by making incisions in the trees, is able to obtain a large supply of this purgative substance.

HARVEY, GEORGE, a Scottish painter, born at St. Ninian's, near Stirling, in 1806. He was one of the founders of the royal Scottish academy. His pictures represent scenes from Scottish history and domestic life, and particularly those relating to the trials and persecutions of the Covenanters. In some, however, the serious character is relieved by a vein of quaint humor characteristic of the artist's nationality. He has also painted landscapes with effect. He resides almost exclusively in Edinburgh.

HARVEY, WILLIAM, an English physician, celebrated for his discovery of the circulation of the blood, born in Folkstone, Kent, April 1, 1578, died in London, June 8, 1657. He was the eldest of a family of 9 children, and at 10 years of age was sent by his father, a substantial yeoman of Kent, to the grammar school in Canterbury, whence in 1598 he went to Caius college, Cambridge. Having taken his degree of B.A., he repaired about 1598 to the university of Padua, where he attended the lectures of Fabricius ab Aquapendente and other eminent professors of medical science, and in 1602 was graduated a doctor of medicine. Returning to England, he settled in London, and in 1607 was admitted a fellow of the royal college of physicians. Two years later he was appointed physician to St. Bartholomew's hospital, a position which he filled uninterruptedly until 1644, and in 1615 lectured on anatomy and surgery in the college of physicians. It was in 1619, while he was discharging the duties of this latter office, that the discovery with which his name has since been associated is supposed to have been made by him, although, from his desire to thoroughly confirm and mature his opinions, the published treatise on the subject, entitled *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus*, and dedicated to Charles I., did not appear until 1628 (4to., Frankfurt). Harvey, it is said, expressed himself indebted to his former master, Fabricius, for his discovery; but beyond the inductive method of research which led to it, and which he acquired from the teachings of the Paduan professor, the merit is undoubtedly his own, notwithstanding the attempts of old writers, and in modern times of William Hunter and Dr. J. R. Coxe, to dispute his claim to the rank assigned to him among the improvers of science. For 2 years previous to the death of James I. he was the royal physician extraordinary, and in 1632 Charles I. appointed him his physician in ordinary. He was thenceforth intimately connected with the court, and frequently prosecuted his anatomical

experiments in the presence of the king, whose fortunes he followed after the commencement of the revolution, and with whom he was present at the battle of Edgehill. He subsequently retired with the king to Oxford, where he was made warden of Merton college and received the degree of M.D., and where he remained until the surrender of the city to the parliamentary forces. Ever more interested in the advancement of science than in the mutations of political strife, he devoted himself while there to researches on generation, a subject which had engaged his attention for some years previous, and upon which he published in 1651, 5 years after his return to London, his second important work, *Exercitationes de Generatione Animalium* (4to., London). His adherence to the royal cause had meanwhile lost him his position as physician to St. Bartholomew's hospital; but he continued to discharge his functions as lecturer at the college of physicians until near the close of his life. In 1652 he received the rare honor of having his statue placed in the college hall, with an inscription testifying to the value of his discoveries in animal physiology. He subsequently built an addition to the college and endowed it with his paternal estate, one of the conditions of the grant being that an oration should be delivered annually in commemoration of the benefactors to the college, and "an exhortation to the members to study and search out the secrets of nature by way of experiment, and for the honor of the profession to continue mutually in love." Three years before his death he was elected president, but declined the office on account of his advanced age. For many years Harvey experienced the treatment with which all innovators or discoverers are familiar, and complained that his practice declined considerably after the publication of his treatise on the circulation of the blood, a result which he had indeed predicted. He was far, however, from being looked upon as an empiric; and notwithstanding the hostility of some eminent continental professors and of the older members of the profession generally, he enjoyed the intimacy of the king, and of Bacon, Hobbes, Dryden, Cowley, and other persons of note in England, several of whom were his devoted partisans. He moreover lived to be considered as the first anatomist and physician of his time, and to see his discoveries universally acknowledged. He was a man of even temper, and in his controversy on the doctrine of circulation with Riolanus, professor of anatomy in Paris, the only one in which he personally engaged, exhibited a forbearance, modesty, and discretion eminently worthy of imitation by naturalists and scientific writers. Harvey's works, which are written in Latin, display elegant scholarship, and occasionally a considerable degree of eloquence. The best edition, published by the college of physicians in 1766 (4to., London), and preceded by a life of the author in Latin by Dr. Lawrence, contains, in addition to his works above enumerated, his reply to Riolanus, an anatomical account of

Thomas Parr, who died at the age of 152, and 9 letters on anatomical subjects. During the civil war his house in London was pillaged, and a number of valuable manuscripts were destroyed, the loss of which he never ceased to deplore. The library of the British museum possesses two manuscript works by him, *De Musculis et Motu Animalium* and *De Animalium Universalis*; the latter, dated April, 1616, contains the germ of the doctrine of circulation. The most recent publication of Harvey's works is the translation by R. Willis, M.D., brought out under the auspices of the Sydenham society (8vo., London, 1847).—For authorities concerning his life, see Lawrence's memoir, Sprengel's "History of Medicine," Aikin's "Biographical Memoirs of Medicine in Great Britain," "Lives of British Physicians" in Murray's "Family Library," vol. xiv., &c.; and for a notice of his discoveries, see CIRCULATION, and EMBRYOLOGY.

HARVEY, WILLIAM, an English engraver of wood and designer, born in Newcastle-on-Tyne in 1796. At the age of 14 he was apprenticed to Thomas Bewick, the eminent wood engraver of that place, and in 1816 went to London and put himself under the instruction of Haydon, whose "Dentatus" he engraved on wood, and until 1824 pursued his professional labors there. For the last 35 years he has almost exclusively devoted himself to designing for wood engraving, and within that period has produced an immense number of works, those representing animals and their habits being considered among the best. Many important publications have been illustrated by him, including Lane's translation of the "Arabian Nights," the "Pilgrim's Progress," Northcote's "Fables," and Knight's "Pictorial Shakespeare." His style is original, but has occasionally mannerisms.

HARWOOD, EDWARD, an English clergyman, born in Lancashire in 1729, died in London, Jan. 14, 1794. He was educated for the ministry, and in 1765 took charge of a small Unitarian society in Bristol. At the end of 5 years, in consequence of charges affecting his religious opinions and private character, he was induced to go to London, where he passed the remainder of his life in literary labors. He was a voluminous writer, and in his "View of the various Editions of the Greek and Roman Classics" (1778), a work now superseded by the manuals of Dibdin and Moss, gave evidence of an extensive acquaintance with classical literature. As a theologian he is known as the author of an "Introduction to the Study of the New Testament" (2 vols., London, 1767-71), "A Liberal Translation of the New Testament" (2 vols., 1767), and "The New Testament collated with the most approved MSS., with Select Notes in English, Critical and Explanatory" (2 vols., 1776). It was his boast that he had written more books than any other living author, except Dr. Priestley.

HASDRUBAL, or ASDRUBAL (in Punic, probably, "he whom Baal aids"), the name of a number of Cathaginian naval and military com-

manders, celebrated in the history of the three Punic wars, of whom the following are the most distinguished: I. Son-in-law, and successor in the command in Spain, to the great Hamilcar Barca, after whose death in 229 B. C. he continued his operations with the assistance of the young Hannibal, founded New Carthage (Carthago, in the province of Murcia), concluded a treaty with the Romans, which made the Iberus (Ebro) the boundary of the Roman and Carthaginian possessions in the peninsula, was killed by a Gallic slave in revenge for the death of his master, and was succeeded in command by Hannibal (221). II. Son of Hamilcar, was left in Spain when his brother Hannibal started on his expedition across the Pyrénées and Alps to Italy (218). Being afterward prevented from following him by a defeat at Ibera, which he suffered from an army under Publius and Cneius Cornelius Scipio, he fought in Africa against Syphax, king of a Numidian tribe, and again in Spain, where he was successful against his former adversaries, both of whom fell (211). Two years later he was defeated by the son of Publius, the afterward renowned Scipio Africanus, though he could not be prevented from crossing the Pyrénées while hastening to the assistance of his brother in Italy. Arrived in Umbria, he lost his army and life on the banks of the Metaurus, between the modern Pesaro and Sinigaglia, being defeated by the Romans under C. Claudius Nero and M. Livius (207). His head is said to have been cut off and thrown into Hannibal's camp. III. Son of Gisco, commander in the 2d Punic war, fought in Spain, 214-7 B. C., was defeated together with Mago by P. C. Scipio toward the end of this period, and retired to Africa, where by giving to Syphax his daughter Sophonisba, already promised to Masinissa, he caused the enmity of Masinissa to the Carthaginians. Together with Syphax he was twice defeated by Scipio, who had landed in Africa in 204. The condemnation to death pronounced against him by the irritated people, which did not deter him from continuing in arms against the enemies of his country, was reversed after the arrival of Hannibal. Finally, however, being driven to despair by the public hatred, he terminated his life by poison. IV. Commander against Masinissa and in the 3d Punic war, when he twice defeated the Roman consul Manilius, bravely opposed Scipio Africanus the younger, and after the taking of Carthage by the latter retired into the citadel, and finally, with a small number of his own troops and a host of deserters, to the temple of Æsculapius. Further resistance being impossible, he secretly went over to the camp of Scipio to implore his mercy. The conqueror spared his life, but showed him to the deserted defenders of the temple, and he saw his wife throw her children and then herself into the flames of the burning edifice. Having adorned the triumph of Scipio, he spent the remainder of his life as a captive in Italy.

HASE, CHARLES BENOÎT, a French philologist of German origin, born in Sulza, near Naum-

burg, May 11, 1780. He was educated at Weimar under Böttiger, and at the universities of Jena and Helmstedt. He went in 1801 to Paris, and studied under the Hellenist Vilvoison, by whose recommendation he was employed in the department of Greek manuscripts in the imperial library. In 1812 Queen Hortense selected him for an instructor of her sons Napoleon Louis, then grand duke of Berg, and Louis Napoleon, the present emperor of the French. He was appointed professor of modern Greek and of Greek palæography in the royal school in 1816; succeeded Bernardi in the academy of inscriptions and belles-lettres in 1824; became professor of the German language and literature in the polytechnic school in 1830; travelled in Greece in 1837, and subsequently in Algeria; was appointed by Louis Napoleon commander of the legion of honor in 1849; and in 1852 was made professor of comparative grammar in the Sorbonne. His dissertations in the *Notices et extraits des manuscrits de la bibliothèque du roi*, in the *Journal des savants*, and in the *Journal Asiatique*, are valuable. He wrote an important preface to Fuss's edition of the *De Magistratibus Republicæ Romanæ* of Lydus (1812); was the first to edit the history of Leo Diaconus (1819), and the work of Lydus *De Ostentis* (1823); and was associated with the brothers Dindorf in preparing the new edition of Stephens's *Thesaurus Lingue Græcæ* (1840 et seq.).

HASE, KARL AUGUST, a German theologian, born in Steinbach, Aug. 25, 1800. He studied theology at the universities of Leipsic, Erlangen, and Tübingen, was imprisoned for 5 months in 1819 at the fortress of Hohensasperg in Württemberg on account of his participation in the movement of the *Burschenschaft*, became *Privatdocent* of theology in Tübingen in 1823, professor of philosophy in Leipsic in 1829, and professor of theology in Jena in 1830. His first important work was a "Manual of Evangelical Dogmatics" (*Lehrbuch der evangelischen Dogmatik*, 1825). In 1829 he published his *Huttenus Redivivus, oder Dogmatik der evangelischen Kirche*, which soon became a favorite text book for theological students, and involved him in a long literary contest. The *Theologische Streitschriften* (8 numbers, 1834), which he wrote in his defence, dealt a heavy blow at the old rationalistic party. His most celebrated work is a "Manual of Church History" (1834), translated into English by O. E. Blumenthal and C. P. Wing (New York, 1855), and universally considered to be unequalled as a text book for the instructor or a compendium for the general reader. He took an active part in the theological questions of the day, and published *Die beiden Erzbischöfe* (1839), on the conflict between Prussia and Rome and the subsequent imprisonment of the two Prussian archbishops. During the excitement following the revolutions of 1848, he advocated a closer union of the German churches on the basis of a new constitution (*Die evangelisch-protestantische Kirche des deutschen Reiches*, 1849). He engaged in a controversy

with C. F. Baur on the theological views of the Tübingen school. He has been since 1844 an assistant editor of the *Protestantische Kirchenzeitung* of Berlin, the central organ of the union, or as it is commonly called, the rationalistic party of Germany. His other works are: *Des alten Pfarrers Testament* (1824); *Vom Justizmorde, ein Votum der Kirche* (1826); *Gnosis* (3 vols., 1827-'9); *Das Leben Jesu* (1829, translated by J. F. Clarke, Boston, 1859); the second volume of Baumgarten-Crusius's *Compendium der christlichen Dogmengeschichte* (1846); *Neue Propheten* (the maid of Orleans, Savonarola, and the Anabaptists, 1851); *Frans von Assisi, ein Heiligenbild* (1856); *Das geistliche Schauspiel* (1858); and, under the assumed name of Karl von Steinthal, *der griechische Robinson* and *Sachsen und seine Hoffnungen*, 1880.

**HASENCLEVER.** I. JOHANN PETER, a German painter, born in Remscheid, Rhenish Prussia, May 18, 1810, died in Düsseldorf, Dec. 16, 1858. He was educated at Düsseldorf under Schadow, and subsequently at Munich, and is considered in Germany one of the most original and forcible of the Düsseldorf school. His department is *genre*, and the humorous element in his works has contributed greatly to their popularity. Among the best of them are a series entitled the "Jobiad," which, with the "Wine Tasters" and other works, are well known through excellent lithographs. II. PETER, a German manufacturer, born in Remscheid, Nov. 24, 1716, died in Landshut, Prussian Silesia, June 18, 1792. For many years he was engaged in commercial undertakings in various parts of Europe, and subsequently to 1748 was influential in promoting the linen manufacture in Silesia. Frederic the Great had a high opinion of his business capacity, and was in the habit of consulting him on important commercial matters. In 1765 he established a house in New York for the sale of hemp, potash, and iron, and became a resident of that city, where he built a number of ships. Having become bankrupt by the mismanagement of a partner, he returned to Europe, and carried on a large linen trade in Landshut until his death. He is the author of "Letters from Philadelphia," in the correspondence of Schloetzer, part 35 (1780), and of a "Description of the City of New York," in the commercial notices of Sinapius, part 4 (1781).

**HASHISH.** See **HEMP**.

**HASLAM, JOHN**, a British physician and writer on insanity, born in Edinburgh in 1768, died in London in July, 1844. He was educated at Cambridge, and studied medicine in London, where he became intimate with John and William Hunter. After receiving his medical degree, he was appointed apothecary to Bethlehem insane hospital, a post which he filled for many years. While here, he wrote his "Observations on Insanity," which was published in 1798. After leaving Bethlehem hospital, Dr. Haslam resided for several years at Edinburgh. In 1819 he was president of the

royal medical society and of the natural history and chemical societies of that city. Some years later he returned to London, and soon attained a large practice there; in 1827 and 1828 he delivered courses of lectures on the intellectual composition of man, which attracted great attention. During the last few years of his life he withdrew from practice. As a writer, Dr. Haslam was the master of a clear, vigorous, and attractive style. His published works are: "Observations on Insanity" (1798); "Illustrations of Madness" (1810); "Considerations on the Moral Management of Insane Persons" (1817); "Medical Jurisprudence as it relates to Insanity, according to the Law of England" (1818); "A Letter to the Governors of Bethlehem Hospital" (1818); "Essay on Sound Mind" (1819); "Lectures on the Intellectual Composition of Man" (1827-'8).

**HASSAN BEN SABA.** See **BATENTIS**.

**HASSE, FRIEDRICH CHRISTIAN AUGER**, a German author, born in Rehfeld, Jan. 4, 1773, died Feb. 6, 1848. He studied at Wittenberg, travelled in western Europe, and officiated as professor of history at the universities of Dresden and Leipzig. He wrote a history of Lombardy (*Geschichte der Lombardei*, Dresden, 1826-'51) and other historical and biographical works. He was connected with the *Conversations-Lexikon* of Brockhaus as editor and contributor, and also in the latter capacity with Ersch and Gruber's cyclopædia, published in concert with several other learned men a *Taschen-Encyclopädie* (4 vols., Leipzig, 1816-'30), and was one of the editors of the *Leipziger Zeitung* from 1830 to 1846.—His eldest son, **FRIEDRICH RUDOLF**, born in Dresden, June 29, 1808, has been since 1848 professor of theology in Bonn, and has written, among other works, *Anselm von Canterbury* (2 vols., Leipzig, 1843-'52).—**KARL EWALD**, brother of the preceding, born June 23, 1810, since 1852 professor of clinical and special pathology at Heidelberg, has written, as a first instalment of a comprehensive work on pathology, *Anatomische Beschreibung der Krankheiten der Circulations- und Respirationsorgane* (Leipzig, 1841), which was translated into English in 1846.

**HASSE, JOHANN ADOLF** (called in Italy *Il Sassone*, the Saxon), a German composer, born in Bergedorf, near Hamburg, March 25, 1699, died in Venice, Dec. 23, 1783. He was a pupil of Porpora and Scarlatti. His opera *Scastrato*, produced at Naples in 1726, established his reputation; and after giving several other works to the Italian stage, the success of which was insured by the coöperation of his wife, the celebrated singer Faustina, he accepted the office of chapelmaster and composer to the elector of Saxony. In 1738 he was invited to London to compete with Handel, and brought out his *Artaxerxes*, in which Farinelli made his debut before an English audience. Although the opera was performed 40 nights, Hasse, disgusted with the virulence of the musical cabals, left London, and about 1740 established himself in Dresden. Upon the bombardment of the city in 1760 he

was so unfortunate as to lose all his musical manuscripts, just as he was about to publish a complete collection of his works. The reverses of the elector soon after deprived the composer of his office at court, and he repaired to Vienna, where he brought out a number of works. The last years of his life were spent in Venice. Dr. Burney considered Hasse the most learned, natural, and elegant composer of his age. His works, including all the *libretti* of Metastasio, some of which he set in several different ways, were so numerous that it is said he often failed to recognize his own music.

HASSEL, JOHANN GEORG HEINRICH, a German statistician, born in Wolfenbüttel, Dec. 30, 1770, died in Weimar, Jan. 18, 1829. He studied at the university of Helmstedt, and received a pension from the duke of Brunswick in reward for his statistical works, which enabled him to devote himself exclusively to that science. He was employed for some time under Bertuch at Weimar, and was placed in 1809 at the head of the statistical bureau in the new kingdom of Westphalia. In 1815 he was sent by the government of Brunswick on a mission to Paris. On his return he relinquished his public office, resumed his labors under Bertuch, and after the death of the latter succeeded him as editor of the *Geographische Ephemeriden*. His principal work is the *Lehrbuch der Statistik der Europäischen Staaten* (Weimar, 1812). He was also an active contributor to Ersch and Gruber's cyclopædia, and edited in concert with Wilhelm Müller, and after his death in 1827 with Hoffmann of Jena, the 2d section of that work, comprising from H to O.

HASSELQUIST, FREDRIK, a Swedish naturalist, born in Törnå, East Gothland, Jan. 3, 1722, died in Smyrna, Feb. 9, 1752. In 1741 he entered the university of Upsal, where, under the direction of Linnæus, his taste for natural science was rapidly developed. In 1747 he published a thesis entitled *De Viribus Plantarum*, in which he exposed the erroneous principles on which plants had previously been used in medicine, and gave the first impulse to the restoration of the old doctrine of "like forms, like virtues." His industry and ability having procured him a royal stipend to travel and study abroad, he proceeded in 1749 to the East, although warned by Linnæus that his constitution was too feeble for the journey. After visiting parts of Asia Minor, Egypt, and Palestine, he died on his way home. His collections and manuscripts, however, were subsequently received by Linnæus, who in 1757 published the results of his pupil's investigations in a work entitled *Iter Palæstinum*, containing his journal and letters, and a variety of original remarks on the physical and social features of the countries he had traversed. This work, of which an English translation was published in 1766 (8vo., London), on account of its varied and accurate information in many departments of natural history, has not yet been superseded as a book of reference.

HASSELT, capital of the Belgian province of Limbourg and of an arrondissement of its own name; pop. of the latter in 1857, 77,882, and of the former, 9,785. It is situated on the Demer, 20 m. by rail from Maestricht, and 42 m. from Aix la Chapelle. The chief manufactures are tobacco, madder, soap, oil, linen, leather, &c.

HASSENPFUG, HANS DANIEL LUDWIG FRIEDRICH, a German statesman, born in Hanau, Hesse-Cassel, in 1793. He became minister of justice and of the interior in 1833; but being extremely unpopular on account of his illiberal policy and threatened with impeachment by the chambers, he was compelled to leave the country in 1837. He was employed by various governments, and officiated for several years in high judicial positions in Prussia; but he was charged with fraud in the rendering of his accounts, from which, however, he was afterward acquitted. In 1850 he was recalled by the elector of Hesse-Cassel, and restored to his former position. He soon resumed his dictatorial proceedings, and paved the way for the revolution which resulted in the flight of the elector to Wilhelmsbad, in the restoration of order by the assistance of Austrian and Bavarian troops, and in the promulgation of a new constitution under the auspices of the German diet. It was mainly by his advice that the elector left Cassel and invoked the aid of the German diet against his own subjects, and he was loth to part with a minister who had served him so faithfully; but Hassenpflug's position became intolerable, and the elector consented at length in 1855 to accept his resignation, since which time he has resided at Marburg, and more recently at Goritz.

HASSKARL, JUSTUS KARL, a German traveller and naturalist, born in Cassel, Dec. 6, 1811, studied in Bonn, and went to Java in 1836, where he was employed at the botanical garden of Buitenzorg and explored the interior of the country. Returning to Europe in 1846, his poverty compelled him to accept the position of secretary of the chamber of commerce in Düsseldorf; but in 1852 he was invited by the Dutch government to resume his labors in Java. His works treat chiefly of the botany of that island. He has also written *Australien und seine Colonien* (Elberfeld, 1849), and translated Cole's "Notes on the Cape and the Kaffirs" into German (Leipsic, 1852).

HASSLER, FERDINAND R. See COAST SURVEY, vol. v. p. 394.

HASTINGS, a municipal and parliamentary borough of Sussex, England, 64 m. S. S. E. from London, with which it is connected by railway; pop. in 1851, 17,011. It is one of the cinque ports, and is pleasantly situated on the sea coast, being sheltered on 8 sides by hills and cliffs. It consists of an old and a new town. The trade is inconsiderable. Crowds of visitors flock to Hastings during the bathing season. Louis Napoleon, shortly before his expedition to Boulogne, lived for a few weeks at the Pelham cottage in Hastings under the name of Col. Elliot. See Miss Howard's "Hastings, Past and

Present" (London, 1856), which abounds with full and interesting details of the numerous antiquities of Hastings.—The battle of Hastings, between William of Normandy and Harold, king of the Anglo-Saxons, was fought Oct. 14, 1066, at Senlac, 9 miles from Hastings. During the previous night there were revelry and confidence in the Anglo-Saxon camp, silence and prayer in the Norman. The Normans, formidable by their cavalry and bowmen, advanced to the attack, and were met by the Anglo-Saxons with their battle axes, the Kentish men in front. The battle continued from 9 o'clock in the morning till sunset, and the Anglo-Saxons suffered severely by advancing to pursue the Normans, who feigned retreat; yet they maintained their position till Harold fell pierced by an arrow. Then their efforts immediately relaxed, and they dispersed at dusk. "The subjugation of a nation by a nation," says Macaulay, "has seldom, even in Asia, been more complete." Upon the battle field the conqueror within two years founded the "abbey of bataille," and the name of Senlac was changed to that of Battle, which the place still bears. The victorious army numbered 60,000 men, more than one fourth of whom were left on the field; the number of the vanquished and their loss are unknown.

HASTINGS, one of the most famous of the Scandinavian vikings, or sea rovers, born about 812, some say in Scandinavia, others in Normandy, others at Tranquilla (modern Trancost) on the Seine. He attached himself to the Northmen, who had established themselves on the island of Bière, and was employed by them first as a brigand for procuring supplies. His audacity, strength, and intelligence soon obtained for him an ascendancy, and ultimately the chief command, both at sea and on shore. His first achievement was the devastation of the banks of the Loire (845), penetrating as far as Tours. He next undertook an expedition against Spain; but meeting a repulse at Corunna, he retraced his course toward France, sacked Bordeaux, and carried fire and sword as far as Toulouse and Tarbes. The people of the latter city celebrate to this day the anniversary of a victory gained by their forefathers over Hastings, on May 21. Refitting at the mouth of the Adour, he sailed again for the coast of Spain, took Lisbon, pillaged the city for 18 days, burned Seville, and marched upon Cordova, but was arrested by the allied forces of the Moors and Christians. Returning with reinforcements, he destroyed the great mosque of Algeciras, and compelled the Spanish king, Alfonso the Great, to seek refuge at Oviedo. Majorca, Minorca, and Provence, in their turn, became also the scenes of Hastings's incursions. The legend is that he next made a descent upon Tuscany, and then planned a voyage to Rome. Putting to sea and steering along the coast into the bay which is now known as the gulf of Spezia, he descried a city (Luna, now Luni), with towers and lofty temples. Not doubting that he was approaching Rome, he disembarked his troops, and sent ambas-

sadors to say to the emperor, as he supposed that, fresh from the conquest of France, he desired only to obtain supplies and means to refit his fleet. For himself, weary of a roving life, he sought to lay down his command and thenceforth to repose in the bosom of the Christian church. The count of Luna and the bishop came out to meet him, and administered baptism; but declined to admit him or any of his followers within the city walls. Hastings then feigned death; and a vast funeral train, passing into the city, deposited the bier before the cathedral altar. The chief then sprang up and struck the bishop to the earth; and the mourners, throwing off their long robes, cut their way back to the city gates, and let in their comrades. The city was won; and Hastings learned for the first time that he was not master of Rome. After countless exploits of almost equally desperate character he once more appeared upon the coast of Normandy. Count Robert of Anjou and the duke of Aquitaine surprised him at Brisserte, near Angers, from which place, after a furious battle, in which both the Frankish leaders were slain, Hastings ascended the Loire, plundered every town on its banks, and sailed for England to join a Danish invasion. Repulsed by Alfred the Great, he reappeared upon the Loire (882), and wrung from Charles the Fat possession in perpetuity of the county of Chartres. He appears thereafter to have sought a home for his old age in Denmark; where at the age of 70 his identity is lost in the confusion of the chronicles, which attribute to him the subsequent exploits of a number of vikings who assumed his name.

HASTINGS, FRANCIS RAWDON HASTINGS, marquis of, an English soldier, born Dec. 9, 1734, died in Baia bay, near Naples, Nov. 28, 1824. He was educated at Oxford, and at the age of 17 entered the army as ensign in a foot regiment. In 1778 he was sent with his regiment to America, and 2 years later, as captain in the 68d foot, participated in the battle of Bunker hill. In 1778 he was appointed adjutant-general of the British forces in North America, with the rank of lieutenant-colonel. His good conduct at the battle of Monmouth in the same year procured him the command of a British corps in South Carolina, which he led at the battle of Camden (Aug. 16, 1780), and with which he subsequently defeated Greene at Hobkirk's hill. Returning to England before the close of the war on account of ill health, he was captured by a French cruiser. Soon after his release he was created Baron Rawdon and honored with several marks of distinction by the king; and in 1793 he succeeded his father as earl of Moira. In the succeeding year he commanded a body of 10,000 men sent to relieve the duke of York in Flanders, which service he successfully performed. Being a whig in politics, he was appointed master-general of the ordnance in the Grenville and Fox ministry in 1806, and after the assassination of Mr. Perceval in 1812 made an unsuccessful attempt to form a cabinet. In the same

year he was appointed governor-general of India, where he remained until 1822. The most important event of his administration was the successful termination of the Nepal war. He was subsequently governor of Malta. In Dec. 1816, he was created Viscount Loudon, earl of Rawdon, and marquis of Hastings.

**HASTINGS, WARREN**, governor-general of British India, born Dec. 6, 1732, died Aug. 22, 1818. He was descended from the Hastings of Daylesford, Worcestershire, but the estate had been sold, and of all their ancient possessions, the grandfather of Warren held only the rectory of Daylesford, to which he had been presented by his father. He had two sons, Howard, a respectable man who held an office in the customs, and Pynaston, the father of Warren. Pynaston, at the age of 15, imprudently married Hester Warren, the daughter of a small farmer, and being in great poverty abandoned his native country, leaving two children to the care of his father. The rector, impoverished by a lawsuit, left Daylesford, and became curate at Churchill, where Warren was sent to the charity school of the village. In 1740, his uncle Howard having taken charge of his education, he went to a school at Newington, where he was well taught but badly fed; to the latter circumstance he was accustomed to attribute his diminutive stature and feeble health. At the age of 10 he was removed to Westminster. Here his mental powers became conspicuous, and at 14 he stood first among his competitors, and was already distinguished for ambition, resolution, and industry. Among his schoolfellows were the poets Cowper and Churchill, William Petty, afterwards marquis of Lansdowne, and Elijah Impey, persons who retained for him a lasting regard. His uncle dying, he was now left dependent upon a distant relative, who, eager to be relieved of his charge, procured for him a writership in the East India company. Those who knew his talents, it is said, opposed this measure, his master Dr. Nichols offering to pay the cost of his education in England; but in Jan. 1750, he went to India. Here he at once began to study the native languages, and was one of the first to make himself familiar with the history and literature of the people among whom he now lived. He was soon noticed by Lord Olive, and was employed in various commercial and diplomatic measures. In 1756 he married the widow of Capt. Campbell, who, together with the two children she had borne him, died before his return to England. He remained in India 14 years, not distinguished in any remarkable manner, but acquiring knowledge and highly esteemed. In 1764 he arrived in England, with a moderate fortune, which was soon exhausted by his liberality to his needy relatives and his profuse generosity; he was even forced to borrow money to pay an annuity of £200 he had settled upon his aunt. His talents and his knowledge of Indian affairs soon brought him again into the

service of the company. In 1769 he was made second in the council of Madras, and in 1772 he became the highest official of the company, the president of the supreme council of Bengal. His power was next enlarged by a change made in the Indian constitution by an act of parliament, which consolidated the separate governments into one, and Hastings became (Jan. 1, 1774) governor-general of British India. The vast territory over which he ruled was composed of new conquests; the English were few in number, and their supremacy was constantly endangered by Hyder Ali, rajah of Mysore, by the Mahrattas, and by other native powers. In these dangers the administrative talent and unwearied constancy of Warren Hastings established the British empire in India. He was unscrupulous, resolute, and apparently cruel; he perhaps depopulated whole districts by his exactions, and committed acts of signal injustice. But success followed him; he defeated opposition in his council, and destroyed his Indian foes. He was not however sustained by the home administration, nor by the board of directors. Rumors of his tyranny in India were assiduously spread over England by his enemies, but the court of proprietors supported him by large majorities whenever the attempt was made to remove him from his office. Encouraged by their support, he now neglected or refused to obey the orders of the board of directors, whenever he thought them impolitic, overawed the minority of his council, and ruled with a power almost unchecked, until Feb. 1785, when he resigned his office, and set out for England, not unconscious of the danger that threatened him there. He left India, it is said, highly popular with the natives as well as the English residents, and followed by general regret. Upon his arrival in England, the opposition in parliament, led by Edmund Burke, introduced a resolution for an inquiry into his conduct, but the proceedings did not commence until the session of 1786, when Burke brought forward his articles of impeachment. Mr. Pitt, intimidated by the unpopularity of the accused, consented to the measure, and gave up Hastings to the opposition. In the impeachment Burke charged him with numerous acts of oppression, with desolating whole regions of British domain, with pecculation and corruption, with exciting useless wars, and with various acts dishonoring the British name. He divided his charges into 4 heads, namely, the oppression and final expulsion of the rajah of Benares, the cruel treatment of the begums or princesses of Oude, unfair contracts, and wasteful expenditure. The sessions of 1786-'7 having been consumed in preliminary measures, the house of lords met in Westminster hall, Feb. 13, 1788, to hear the impeachment. The hall was richly adorned, and a distinguished assembly of royalty and nobility, of men of genius, of influence, and of fame, gathered to hear the trial. Hastings, frail, small, sickly, but still resolute, knelt at the bar, and then heard



without emotion the terrible denunciations of his accusers. On the 15th Burke, in the name of the commons of England, opened the charge in a speech which lasted 3 days. He was assisted by Fox, Sheridan, Grey, and others, and also in private by Sir Philip Francis. (See FRANÇOIS.) During the sessions of 1788-'90 the prosecution presented its charges. In 1791 the commons, to shorten the trial, were willing to withdraw some of the articles, and on June 2, the 73d day of the proceedings, Hastings began his defence. This continued until April 17, 1795, on which day, the 148th, he was acquitted by large majorities on each separate charge. Public opinion had turned in his favor, and his acquittal was approved by a majority of his countrymen. He convinced the nation that his measures had secured its prosperity, and showed by his poverty that he had not amassed wealth in his government. The expenses of the trial, £76,000, had consumed all his fortune, and he was now scarcely able to pay his weekly bills. In March, 1796, the East India company granted him an annuity of £4,000 for 28½ years, and lent him £50,000 for 18 years without interest. He now purchased the Hastings estate at Daylesford, and retired from political life, occupying himself in rebuilding the family mansion, and in agricultural pursuits, seeking to naturalize in England the plants and animals of India. During his second voyage to India, he had become acquainted with the baron and baroness Imhoff, who were his fellow passengers. The baroness attended him during a severe sickness on shipboard, and about a year after his arrival in India, the baron having procured a divorce, his wife became Mrs. Hastings. This lady, who was accomplished and attractive, always preserved his regard, and now presided over the hospitalities of Daylesford. Hastings had long aspired to a peerage, but never received any higher public honor than an appointment as privy councillor, which took place a short time before his death. He was however treated with the most distinguished respect by both houses of parliament when in 1813 he appeared at the bar of the commons as a witness on Indian affairs. In private life Warren Hastings displayed many virtues. He was generous, unselfish, hospitable, and a steady friend. He was a good scholar, and wrote with readiness and force. He encouraged among his countrymen the study of the Indian languages and history. He was for a time president of the Asiatic society, promoted geographical research, invited learned Hindoos to settle in Calcutta, founded colleges for the instruction of the native youth, and urged upon them the necessity of becoming familiar with the language, literature, and science of England. In his political conduct he is generally allowed to have shown remarkable ability. Lord Macaulay says that he administered government and war with more than the capacity of Richelieu; and Mr. Mill, the historian of British India, thinks him the most eminent of the chief rulers of the East India company.

HAT (Saxon, *hæt*, a cover), a covering for the head. In some form man appears to have made use of a hat to protect the head from the cold of winter, the burning rays of the sun, or against blows in battle, from the most remote periods. It was constructed in various shapes and of the greatest variety of materials, according to the purpose for which it was designed. As a part of defensive armor, the hat was the helmet, which still retains its primitive shape: as a protection from the weather, it was the cap, such as we see in the ancient figures representing the goddess of liberty. The ancient Greeks appear to have employed several other kinds of head dress, the names and appearance of which have been faithfully preserved in their writings, as well as engraved upon antique gems. Hesiod in his "Works and Days," book ii., describing a suitable dress for a farmer in cold weather, says:

Then for thy head a *pilon* wrought with care,  
Both ears enclosing, cautiously prepare:  
For piercing are the morning winds which blow  
Chill from the north and drive the falling snow.

Strutt speaks of the *pilos* as a woollen cap, which was sometimes worn as a lining to the helmet; and he quotes several Latin authorities to show that it was adopted by the Romans at the public games and festivals, by those who had previously been slaves, and by the aged and infirm for the sake of its warmth. It is supposed to have been made of felt, in some of its forms not unlike hats of the same material that may be seen at the present day. Of a conical shape, it was the *apex* of the Roman priests, worn probably from the time of Numa; with an elevated crest pointed forward, like the liberty cap, it was the Phrygian or Mysian bonnet; with a brim, it became the *petasus*, a hat much like the round felt hats now worn. Alexander the Great wore such a hat, and Caligula permitted the people to use it at the theatre to shade their faces from the sun. (See Strutt's "Ancient Habits," introduction, p. xov.) The helmet was an object of special regard with the warriors of ancient Greece and Troy, not only for defence, but also as an ornament; this is apparent from the descriptive epithets applied to it by Homer, some referring to the horse-hair decorations of its crest, for which in after times were substituted plumes of feathers, and some to the golden decorations, which it is supposed were of fine wires of gold. The chief commanders wore them with 3 conical points, but the helmet of Agamemnon had 4. They were generally made of brass, but sometimes of leather, or even of untanned skins. Of the latter materials they were also worn without crest or cone, fitting closely to the head, and covering it completely except the face.—Among the Romans the cap was regarded as a symbol of liberty, and slaves were presented with a cap on receiving their freedom. After the assassination of Cæsar coins were issued by Brutus and Cassius, on which a cap was represented between two daggers; and after Nero's

death many Romans put on caps in order to proclaim the restoration of their liberties. Even at a later period the cap or hat was identified with liberty, as for instance in the republic of the Netherlands after the emancipation from Spain, when a hat became the national emblem. The first hatters in the middle ages appeared in Nuremberg in 1860, under the name of *Felle-Kappenmacher* (manufacturers of felt caps); in France from 1880 to 1422, under the reign of Charles IV.; and in 1401 in Würzburg, Bavaria. Charles VII., on his entrance into the city of Rouen in 1449, is represented as wearing a felt hat. At the beginning of the 16th century it was already a common usage for the government of Worms to send annually a messenger to that of Frankfort with a felt hat, as a symbol of petitioning for release of custom house duties. The Anglo-Saxons, as would seem from the drawings that have been preserved representing their dress, wore for the most part no other covering for the head than the long flowing hair they sedulously cultivated. The few examples of caps are very simple in form, and even scanty in their dimensions. About the 8th century they made use of caps resembling the Phrygian bonnet. "Those of the lower class of people," says Strutt, "appear rough behind, and probably were composed of the skin of some animal dressed with the hair upon the hide, and the shaggy part turned outward. When the men of quality wore this kind of covering, it was usually enriched with some species of ornament. Another cap, in the form of a perfect cone, was worn occasionally by the nobility." Speaking of the head dress in use in the 9th century, the same author observes: "The hat was, I doubt not, made of various materials, and by no means seems to be a part of dress universally adopted; from its general appearance I have supposed it to have been made of skins with the shaggy part turned downward, and probably it might often be so; but they had also felt or woollen hats at this period (*fellen hat*), which their own records testify." Mention is made of hats by the oldest English writers, as in "Piers Ploughman," and in the "Somptuere's Tale" of Chaucer. Froissart also in his chronicles has several allusions to hats; and from the old translations it would appear that they were worn in the 14th century of various shapes and gayly ornamented with plumes. The color seems to have been generally red or scarlet, and the material "a fine kinde of haire matted together." About the middle of the 13th century one of the "nobels of the lande mett at Clarendon" is described as wearing "a hatte of biever." Thus early was the excellence of this fur for the manufacture of hats appreciated. Stubbs, in his "Anatomie of Abuses," published about 1585, gives a graphic account of the curious and extravagant styles of hat in fashion in his time: "Sometimes they use them sharpe on the crowne, peaking up like the spire or shaft of a steeple, standing a quarter of a yard above the crowne of their heads; some more, some

lesse, as please the fantasies of their inconstant minde. Other some be flat, and broad on the crowne, like the battlements of a house. Another sorte have round crowns, sometimes with one kinde of band, sometimes with another; now black, now white, now russed, now redde, now grene, now yellow; now this, now that; never content with one color or fashion two daies to an end. And as the fashions be rare and strange, so is the stuffe whereof their hattes be made divers also; for some are silk, some of velvet, some of taffetic, some of sarsnet, some of wool, and, which is more curious, some of a certaine kinde of fine haire; these they call bever hattes, of xx. xxx. or xl. shillings price, fetched from beyond the seas, from whence a greate sorte of other vanities doe come besides; and so common a thing it is, that every serving man, countrieman, and other, even all indifferently, doe weare of these hattes." The hat being the most conspicuous article of dress, and surmounting all the rest, it was natural to give to it special care and attention, to place in it showy plumes and jewels, and surround it with bands of gold and silver. To it were attached ornamental rosettes, and those designed as badges of honor or of office. Its form and sometimes color were also made to designate the rank and character of the wearer, the monarch being known by his crown, the cardinal by his red hat, betokening a readiness to spill his blood for the sake of Jesus Christ, and the court fool by the cap with a bell. In one form it served to distinguish the military officer, and in another the peaceful Quaker. According to an old ballad descriptive of the different kinds of covering for the head:

Any cap, whate'er it may be,  
Is still the sign of some degree.

—Among the great variety of hats used by the English the forms of which are preserved in old pictures, none combine the grace, elegance, and comfort to the wearer of the soft hat of the Spaniards, which the latter have retained in use, while the fashion of the English hat has been continually changing. The broad folding brims of past generations, turned up to form the cocked hat and various other styles, have almost entirely disappeared, the felt hat being the only representative of them in general use. The fashion for many years has been the stiff cylindrical hat with narrow brim; but the soft hats of wool and felted fur are again largely manufactured for common wear, and those of the most ordinary kinds differ but little from the ancient *petasus*. The manufacture has been carried to the highest perfection in the United States, and in London and Paris the American is now frequently known as such by the excellence of his hat. The representations made by the London board of trade to the house of commons in 1782 refer to the complaints of the hatters in London at the extent to which the manufacture was carried on at that early day in New England and New York. This is noticed in Salmon's "Modern History" (1746);

but no particulars are given as to the qualities of the hats.—Without including caps and straw hats, the kinds in general use may be classed as those which are felted throughout, and those which are made with a covering, usually of silk plush upon a prepared stiff body. In the former class are included the coarse qualities made entirely of wool mixed with hair and stiffened with glue; those called plated, which are furnished with an external pile or nap of finer material than the body, and sometimes water-proof stiffened before the nap is put on; and those called short naps, in which some of the better class of fur is worked in the plating or nap, and all are water-proof stiffened. Beaver hats, formerly esteemed the best of all hats, have merely a nap of the fur of the beaver, which is felted into the body; the best hats being finished with the finest fur taken from the belly and cheeks of the animal, and the inferior qualities with that from the back. The soft genuine beaver hats, which are now rarely seen, were made upon a body of rabbits' fur. As beavers' fur became scarce, nutria was substituted for it, also the fur of the musquash, hare, and rabbit; and for the body lambs' wool and that of the llama were used instead of rabbits' fur. The consumption of the fur of rabbits has become so great, that it has been found an object about the large hat establishments to breed these animals. This is done in extensive warrens in England and on the continent of Europe, and the practice was introduced a few years ago in the United States at Danbury, Conn. The American production of fur for hat bodies is, however, insignificant. The negroes in Virginia and North Carolina collect some skins of the common rabbit, which are disposed of in New York; but the principal supplies come from towns on the continent bordering on the German ocean, and from Frankfort-on-the-Main, Brussels, and a few other places. The furs are there obtained in large quantities, and have the excellent quality of thickness due to a cold climate. The animals that furnish it are the common gray and white rabbits, or more properly hares, and it is known in commerce as "cony or Russia fur." The hairs are shaved off close to the root, so as to hold slightly together in one piece. A number of these, each rolled up by itself, are put in a paper bundle, which is pinned together with 4 large rough pins, and is then boxed with many others. The fur is sold by the pound, the price varying from \$1.50 to \$5, according to the quality. The largest quantities of this are purchased by the hatters, and sent with their orders to the manufacturing establishment of H. A. Burr and co. in New York, where hat bodies are prepared by their patented machinery upon an immense scale for the supply of hatters and agencies in New York and all parts of the United States. For several months together they have been produced at the rate of 10,000 a day. The fur taken from the bundles is first mixed, the different qualities together, and the finest carded

cotton is added in the proportion of  $\frac{1}{4}$  to  $\frac{1}{2}$  oz. of cotton to 4 or 5 oz. of fur, the usual quantity required for a felt hat; and at the same rate for the lightest fashionable hats intended to weigh only about 8 oz. The mixing is effected in a picking machine, into which it is drawn as fed and, immediately seized by a toothed picker, which revolves with great velocity, creating a powerful current of air, it is tossed about in the capacious box forming the top of the machine, and carried as it falls upon an endless apron, which delivers it to a second pair of feed rollers and another picker, by which the operation is repeated. The fur discharged from this contains the long hairs and bits of pelt and other impurities, from which it is to be separated in the next process, which is called "blowing." The machines for this are contained in a box sometimes 20 feet in length, and about 7 in height, in which case there are 8 sets of the same apparatus of pickers and screens, succeeding one after the other. As the fur is fed in at one end, it is taken by the feed rollers against the points of a cylindrical picker, which revolves several thousand times in a minute. This has the effect of instantly striking out a large portion of the heavy hairs and coarse particles, and tossing the light fur up into the upper portion of the box where it is blown forward to the next set, in which it is subjected to a repetition of the same process. The coarser portions fall upon an inclined screen, which is kept in agitation. The loose hairs and refuse stuff fall through this and the portion that is shaken off the screen is delivered back on the floor under the point of starting. As it collects it is taken up and sent through again. Much of the dust separates through the perforated sheet copper with which the machine is covered. There are some 30 of these machines in the factory of Messrs. Burr and co., each of them having from 4 to 8 screens. They are run by the steam engines belonging to the works, two of which are kept alternately employed, one of 400 and one of 200 horse power. The next process is to form the hat body—an operation that has been accomplished by various methods, as by bowing and working the fur together by hand, and thus felting it; also by what is called the pneumatic process, noticed in the article FELT, by which a mat is obtained that is afterward worked upon a block into the required shape. Mr. Thomas Blanchard of Boston, some years since, by exhausting the air under a fine wire gauze, caused the fur to be drawn together upon this and partially felted, in the form of a thin narrow ribbon. This was then wound upon a double cone of the size and form for 2 hat bodies. The next great improvement was that of Mr. Henry A. Wells of New York in 1846, afterward improved by Mr. Burr. He made a cone of sheet copper punched full of round holes, and, setting it upright, caused it to revolve slowly upon its axis. Under this an exhausting fan is put in action, causing by its rotation of about 4,000 times in a minute a current of air to draw through the holes

from the outside. A trunk or box with a vertical opening directed against the cone discharges the fur, which is fed into it at the other end. Here it is received from the feeding apron in quantity just sufficient for one hat body. It is drawn in between two horizontal feeding rollers covered with felt, and immediately seized by a cylinder revolving about 3,600 times in a minute, and furnished with several longitudinal lines of stiff brushes. This generates a current of air, which scatters the fur, and blows it toward the mouth of the trunk, where it is rapidly drawn upon the perforated cone and evenly spread over the top and down the sides of the same, in quantity enough for one body in 16 revolutions. Mr. Burr improved the discharging trunk, so that it could be adjusted to deposit more or less fur on any desired portions of the cone. As the fur collects, the workman picks off any coarse particles that gather on the surface, and when the supply for one hat body is deposited he wraps a wet cloth over the cone, and slips a metallic cover over the whole, which he removes into a tank of hot water. A new cone is immediately set in its place to receive another coating of fur. The hot water makes the mat more tenacious. It is soon slipped off the cone, taken to a table, gently worked by hand-rolling in a piece of blanket, squeezed and pressed, and then folded into convenient shape. It is now ready to be pressed with others to be made up into the bundles, in which the bodies are sent to the hatters. The material has not yet assumed the form or size of a hat. It is a large open-mouthed bag, smaller and rounded at the closed end. It is afterward reduced in size by felting, a process which, applied for this object, is called "sizing." This does not employ machinery, and is performed either by the finishers of the hat, or at intermediate establishments, as will be presently noticed. In making the bodies by the old hand process, a man used to be occupied a whole day upon 4 or 5. By the machine just described, and known as the "former," tended by 2 men and a boy, and employing another in rolling the bodies, 400 of these are completed each day, all of which are alike in shape, weight, and thickness. The cost of the labor on each is estimated at from 6 to 10 cents. The inferior bodies made by the old method cost for labor about 56 cents; their manufacture is now generally abandoned. The market of the United States is in great part supplied from the establishment and agencies of the Messrs. Burr. In 1856 they turned out about 8,000,000 bodies; and the machines furnished by them to their agencies and licensees in different parts of the country had a capacity of about as many more. The machines are made in the shop appropriated to this purpose in their own works; and the formers especially are constructed with great mechanical skill and perfection. Sizing the bodies is practised by the manufacturers of felt hats for themselves, but by a division of labor the larger makers of silk hats have this work

done by others. It is a hand process, consisting chiefly in rubbing a pile of several bodies, first dipped in hot water and rolled in a piece of blanket, upon a plank table. This is arranged around a central caldron affording accommodation for 8 to 12 workmen, and the whole is known as the hat maker's battery. By rubbing for a few minutes the bodies in the pile are reduced in size, and the felt is rendered more close. A skilful workman knows just how far to carry the process; and when it is completed he folds the bodies, now called shells, each one by itself, and lays them on shelves if intended for the manufacturers of silk hats. As received by these, the first process to which the shells are subjected is that of water-proof stiffening. A workman saturates one in a weak solution of shell lac, slips it over a block, and shapes it with his hands, rubbing in the solution. It is then brushed over the brim and edges of the top (called the tip) with a thicker solution of the gum for the purpose of stiffening these parts. After standing some time to dry, it is ironed with a hot iron, care being taken not to burn the gum. The heat softens the shell lac, but on cooling it becomes harder than before the ironing. A thin coating of fine glue or gelatine is now laid on, the effect of which is to prevent the varnish which is next applied from striking in. This varnish is of seed lac, and when laid on, the body is ready for the finishing room. It is there taken to a table where are a number of brass gauges, and a workman applying one of these trims the brim to the exact shape required by the order from the retail hatter. For fashionable hats not the slightest deviation is allowed in this particular from the pattern. The silk plush, already cut and sewed together, is now laid over the body. A circular piece for covering the top is sewed with a seam hardly discernible to that which goes around the body, the two edges of this meeting in a straight line up and down the side. The brim is covered by one piece on the upper and another on the under side, and the edges are concealed by the binding afterward sewed on, and by the narrow band attached in the same way. The plush itself is secured by ironing with a hot iron, which softens the varnish and causes it to stick the plush to the body. Fashionable hats require the best quality of French plush, and that made by Martin of Paris is held in the highest estimation for the excellence of the black dye with which it is prepared. The hat is now lined and trimmed, the sewing being done entirely by hand and in the most skilful manner; the lining of some hats is of the best English sheepskin split, and of French silk. It is afterward smoothed and shaped with the iron, and much care is given at last to finishing the brim, which is rubbed while softened by heat with smooth brass instruments of suitable shape, and at the same time is curled with the hand, the workman judging by his eye of the perfection of the outline. The superiority of the best American

silk hats is owing to the scrupulous care in the selection as well as in the manipulation of the materials. For the cities their weight hardly averages 3 oz. each; but those made for the trade of the interior, where they are expected to last a year instead of 2 or 3 months, are somewhat heavier. The best, as before stated, are not surpassed in Europe. The French make hats of similar quality; but in England the humidity of the climate will not admit the use of hats so light as those worn in American cities.

—Felted fur hats are produced at numerous establishments; and they are of a great variety of qualities according to the materials employed and the style of finish. A description of the process is hardly required after the account already given. The aggregate amount of business done in this branch of fur and wool hats alone in New York city is immense. The houses engaged in it below Trinity church in Broadway, it is believed, sell over 5,000,000 hats annually. The manufacture of felted wool hats is conducted throughout in the same establishment. The long fibres of wool are easily felted into a mat by various methods, and of this a ruder and cheaper quality of hat is made than those of fur.—Straw was long since applied to the manufacture of hats in tropical climates, and in southern Europe it was most skillfully plaited 2 or 3 centuries ago. The hats of Leghorn and other parts of Tuscany, made of a short and small wheat raised for the purpose on the Arno, were especially famous. They first became favorably known in England in the 18th century, and the straw itself was soon imported there with the Italian method of plaiting, in which 18 straws not split are commonly used, 6 being turned to one side and 7 to the other. A broad flat plait is produced, which is continued to any desired length, and at last coiled up in large circular flats, the coils knitted together by threads, and in this state they are ready for exportation. The English then applied their own grasses to the same manufacture, and the wheat grown upon the chalky soil near Dunstable was found so well adapted to the purpose, that the hats of this name acquired a high celebrity. The business was extended in the counties of Bedford, Hertford, and Buckingham especially, till, according to a recent estimate, 70,000 persons are employed in the trade, producing a yearly return of from £800,000 to £900,000. By the process, as perfected in Great Britain, the best and whitest straws, cut into equal lengths, are bleached by fumes of burning sulphur, and split each one into several strips by means of a wire with a number of cutting edges which is passed up the straw. The strips softened in water are ready for plaiting; and as the plait is formed it is flattened by pressing it between wooden rollers. To form the hat, it is wound spirally over a block, the adjacent edges overlapping each other and being secured by sewing. In New England, especially in Massachusetts and Connecticut, this manufacture employs great numbers of women and children; and many im-

provements have been made in the process, particularly in bleaching the straw. It is split by drawing the whole straw over a little comb-like instrument having sharp teeth which penetrate the straw and divide it into strips. In Massachusetts beautiful hats for ladies have been made from some species of *poa* and *agrostis*, the meadow and field grasses; of the latter the *A. vulgaris*, red top, has been found well adapted for this use.

HATTERAS. See CAPE HATTERAS.

HATTI SHERIF (Turkish, noble writing), any ordinance written by the sultan's hand, or which contains his *paraph*, and the words: "Let this my order be obeyed." Sometimes it is called *hatti humayoun*, "angust writing." A *hatti sherif* is irrevocable. The most celebrated in modern times was the *hatti humayoun* of Gulhana, promulgated by the sultan Abdul Medjid, Nov. 3, 1839, guarantying life and property to all subjects of the empire without distinction of creeds. This *hatti* was confirmed by a new *hatti sherif*, Feb. 18, 1856, which grants religious liberty to the non-Mohammedan population, abolishes the civil and judicial authority of the Mussulman ecclesiastics, proclaims the equality of all creeds and nationalities, abolishes persecution and the punishment of religious converts, makes non-Mohammedans admissible to public office, and ordains their representation in the council of state, permits foreigners to hold landed property, decrees the establishment of public schools, the codification of the laws, the reform of the monetary system and of the police, and proposes to introduce other public improvements.

HAUCH, JOHANNES CARSTEN VON, a Danish poet, born in Frederikshald, Norway, May 12, 1791. He was graduated at the university of Christiania in 1821, travelled in France and Italy, composed several of his dramas while in the latter country, and returned to Denmark in 1827. For several years he officiated at the university of Sorbø as professor of natural science. In 1846 he became professor of northern literature at Kiel. Expelled from that office at the revolution of 1848, the late queen Maria Sophia Frederica offered him an asylum at the castle of Frederiksborg, where he has since resided. After the death of his friend Oehlenschläger in 1850, he succeeded him as professor of æsthetics and belles-lettres at the university of Copenhagen. His works comprise many tragedies, as "*Bajazet*," "*Tiberius*," "*Gregory VIII.*," "*Don Juan*," &c., some of which he translated into German; a dramatic epic, *Hammadyaden*, which belongs to the German romantic school, and was greatly admired by Tieck; lyrical poems and romantic tales, as *Wilhelm Lebern* (2d ed. 1848), *Guldmageren* (2d ed. 1851), *Saga om Thorvald Vidfoale* (2 vols., 1849), &c. His works are very popular, and have placed him in the front rank of Danish poets. His *Die nordische Mythenlehre*, in German, appeared in Leipzig in 1848. In concert with Forchhammer he has prepared the "*Life of Oersted*" (Copen-

hagen, 1853, the German translation of which appeared in Spandau in 1853); and he has also written extensively on the natural sciences, especially zoology.

HAUFF, WILHELM, a German novelist, born in Stuttgart, Nov. 29, 1802, died there, Nov. 18, 1827. He studied at the university of Tübingen, became private teacher at Stuttgart, and published in 1826 a collection of tales (*Märchenalbum*), which passed through many editions, and was followed by *Memoiren des Satans* and *Der Mann im Monde*. In the latter he endeavored to caricature Heun's licentious style of writing, under whose *nom de plume* of Claren he published his work, leading to a lawsuit, brought against him and won by Heun. More effective was his *Controverspredigt über H. Claren*, which ruined that author in the public mind. Among Hauff's most popular novels are *Lichtenstein*, *Die Bettlerin vom Pont des Arts*, and *Das Bild des Kaisers*. His *Phantasien im Bremer Rathskeller* (Stuttgart, 1827; with illustrations, Bremen, 1847) is a most genial and original piece of humorous and fantastic writing. His complete works have been published by his biographer Gustav Schwab in several editions, of which the best was issued in 1846 in 18 vols., and the 8th in 1859. His "Popular Tales" were translated into English (London, 1845), and several of his works recently into French.

HAUGHTON, WILLIAM, an English dramatist, born in the latter half of the 16th century, died probably in the early part of the 17th. He is supposed to have written a number of dramas in connection with Decker and others, and a few unassisted. In Henslowe's "Diary" he appears frequently as the recipient of small sums, advanced on account, for works he was engaged upon. The only plays attributed with certainty to him are the comedy, "Englishmen for my Money, or a Woman will have her Will," which is reprinted in "The Old English Drama" (4 vols. 12mo., 1880), and the "Pleasant Comedie of Patient Grissill," in which he was assisted by Chettle and Decker, and which was reprinted by the Shakespeare society in 1841.

HAUKSBEE, or HAWKSBEE, FRANÇOIS, an English natural philosopher, born in the latter part of the 17th century, died subsequent to 1781. He was influential in developing the science of electricity, as his discoveries, though slight in themselves, had the effect of drawing the attention of scientific men to the subject. He was the first to mark the circumstances of electrical attraction and repulsion, and to observe the production of light by friction both in air and in a vacuum. He published works on electricity and other philosophical subjects, beside numerous papers in the "Transactions" of the royal society, to which he was curator of experiments.

HAUPT, MORITZ, a German philologist, born in Zittau, July 27, 1808, is the son of Ernst Friedrich Haupt (1774-1843), who prepared admirable Latin versions of some of Goethe's

poems, and of some German hymns. He studied in Leipsic under Hartmann, and in 1848 was appointed professor of the German language and literature there. His lectures were numerously attended, but were interrupted on account of his participation in the political movements of 1849. The government took proceedings against him, which resulted in his acquittal in 1851; but not being permitted to resume his functions in Leipsic, he accepted in 1858 a professorship of Roman literature at the university of Berlin. His writings principally relate to German and classical philology. He has published editions of the poetical works of some of the minnesingers, and after Karl Lachmann's death (1851) he completed for the press the 8d edition of the *Nibelungen* (1852), and the 8d edition of the poems of Walther von der Vogelweide. From 1836 to 1840 he edited in conjunction with Hoffmann the *All-deutsche Blätter*, and in 1841 he founded the *Zeitschrift für deutsches Alterthum*.

HAUSER, KASPAR, a German youth remarkable on account of his mysterious birth, forlorn condition, and tragical end. He was found in the streets of Nuremberg, May 26, 1828, dressed in the garb of a peasant, and attracted by his apparent helplessness the attention of one of the citizens. He had in his possession a letter for a military man stationed in that town, from which it appeared that since he was 6 months old his mother had left him in charge of a poor laborer, the writer of the letter, who kept him in close confinement, but brought him up in the Christian religion and taught him to write. The time having arrived for relinquishing the custody of the boy, the laborer removed him from his house during the night and escorted him as far as the vicinity of Nuremberg, leaving him to reach that town alone—a matter of some difficulty, considering that the child was unaccustomed to walking. Enclosed in the letter was a note purporting to come from Kaspar's mother, and stating that she was a poor girl when she gave birth to him (April 30, 1812), and that his father was a cavalry officer at Nuremberg. The only information which the officer to whom the letter was addressed could elicit from the boy was that he came from Ratisbon, and wanted to become a cavalry officer as his father had been. He was removed to the station house, but was unable or unwilling to give any account of himself, except that his name was Kaspar Hauser. He would not take any thing but bread and water; other food did not agree with him. He could write his name and a few other words, but was otherwise entirely ignorant. Nothing was found upon his person excepting a pocket handkerchief with his initials marked in red and several Roman Catholic prayer books. He was of a delicate constitution, but well formed; his hands and feet were elegantly shaped, and his general appearance was that of a high-bred youth. He was detained in prison as a vagrant, but the mayor of Nuremberg frequently took him to his

house, and gradually learned from him that from his earliest childhood he had been kept in a kind of cellar, from which the light was shut out by a pile of wood, which barricaded the windows. No human being ever came to see him, excepting a man during the night, who washed and dressed him and brought him bread and water. His only amusements were two wooden horses, and while in the Nuremberg prison he retained a marked predilection for this kind of toys. Shortly before he was taken away, the same mysterious man, whose face he was never permitted to see, came more frequently to teach him to write and to walk, and eventually he carried him on his back to Nuremberg. This, in substance, was Kaspar's own version of his case. A great deal of sympathy was felt for him, and after having been in prison for about two months, he was handed over to Professor Daumer, who undertook his education. But the natural ability of which he had given evidence in his conversation decreased in the same proportion that he was subjected to a regular system of instruction. He mastered, however, writing and drawing. He was especially fond of riding on horseback, and rode well. One of his many peculiarities was that he could not bear the presence of priests and physicians, and that he was restless and uneasy in church. He entered Mr. Daumer's family July 18, 1828. On Oct. 17 the professor's mother found him lying prostrate in the cellar with a wound on his forehead. Kaspar stated that a man whose face was blackened having cut him with a knife, he ran away from the man and hid himself in the cellar. The most searching investigations were unavailing to detect the man. By order of the authorities the poor boy was now removed to the residence of a magistrate and attended by two policemen, but had only been there a few months when one day they heard the report of a firearm, and on entering the room whence it came they found Kaspar weltering in his blood. His explanation was that the wound had been inflicted by the accidental discharge of a pistol. Among the many strangers who became interested in Hauser's fate was Lord Stanhope, who came to Nuremberg in 1831. He adopted him as a son, removed him to Anspach with a view of completing his education, and placed him in a law office there, where he displayed, however, but little ability or zeal. He also provided Feuerbach, the celebrated criminal lawyer, and president of the court of appeal, with the means of pushing the legal proceedings, and was about taking his protégé to England, when Kaspar was stabbed in the side, Dec. 14, 1833. He was able to reach his home, and to state that his murderer was a stranger, who professed to be the bearer of some important revelations, and whom he met by appointment in the palace garden, when the wound was inflicted, from which he died 8 days afterward (Dec. 17). Persons were not wanting who regarded Kaspar Hauser as an impostor, and Merker publish-

ed a work entitled "Kaspar Hauser probably an Impostor" (Berlin, 1830). The chevalier Lang argued that he had committed suicide for fear of a speedy discovery of his deceptions; but his views were not published until 1834, after the death of Feuerbach (Dec. 17, 1833), who had gained more insight into the case than any other person, and who had removed all imputations upon the character of the deceased in his "Kaspar Hauser, an Example of a Crime against the Life of the Soul" (Anspach, 1832). At the same time Prof. Daumer, his former guardian, defended the youth upon psychological and moral grounds, and Dr. Heidenreich disapproved in the *Journal für Chirurgie*, edited by Gräfe and Walther, the possibility of suicide upon anatomical grounds. The case continues to be wrapped in mystery. A memorandum was found on the spot where Kaspar was wounded, stating that the murderer came from the Bavarian frontier. This was the same point whence the communication was dated which was found upon Hauser when he first came to Nuremberg. But no clue to the murderer was found, although the king of Bavaria offered 10,000 florins reward, and Lord Stanhope 5,000 florins. The legal investigations are still going on in Germany, and the literary warfare respecting the case has been lately resumed with great spirit, not only in Germany, but also in England. Prof. Daumer is the most indefatigable of all those interested in the matter. His "Revelations on Kaspar Hauser" appeared in Frankfort-on-the-Main in 1859, and Broch's "Kaspar Hauser" in Zürich, also in 1859. There are a variety of other works on this subject, which has a strong hold upon the public mind in Germany, many believing that Kaspar Hauser was the offspring of some sovereign, who discarded him for dynastical reasons, while others associate with this view of the case romantic stories of love, adultery, and revenge, culminating in his murder.

HAÜSSER, LUDWIG, a German historian, born in Cleeburg, Alsace, in 1818. He studied philology and history at Heidelberg and Jena, became in 1840 private tutor, and in 1850 professor of history at the university of Heidelberg. He is classed among the best living historians of Germany, and is highly esteemed as a popular lecturer. During the ecclesiastical disturbances in Baden in 1853, he was conspicuous as a leader of the agitation of the laity against a new liturgy supposed to have a Catholic tendency. His principal works are: *Die deutschen Geschichtsschreiber von Anfang des Frankenreiches bis auf die Hohenstaufen* (1839), and *Deutsche Geschichte vom Tode Friedrich's des Grossen bis zur Gründung des deutschen Bundes* (4 vols, 1854-7). In 1850 he edited the works of Lis-

HAUSSONVILLE, CHARLES OTHÉLIN BERNARD DE CLÉRON, count, a French author, born May 27, 1809, has been secretary of legation at various European courts, and several times elected to the chamber of deputies. His principal works are: *Histoire de la politique exté-*

*lours du gouvernement Français de 1830 à 1848* 3 vols., 1850), and *Histoire de la réunion de la Lorraine à la France* (4 vols., 1854-'9).

HAUT-RHIN (Upper Rhine), a N. E. department of France, in the old province of Alsace, bordering on Switzerland and the grand duchy of Baden; area, 1,548 sq. m.; pop. in 1856, 499,442. Its W. and S. W. parts are mountainous, being traversed by the ridge which connects the Jura with the Vosges. In the E. it is comparatively level. The principal rivers are the Rhine, which forms its E. boundary, and the Ill. There are several lakes. The soil is fertile, and various species of grain, potatoes, tobacco, hemp, flax, and wine are produced. About one third of the surface is covered with forests, and the department contains mineral springs, granite, marble, porphyry, jasper, agate, sandstone, marl, coal, lead, zinc, copper, iron, arsenic, and cobalt. The principal manufactures are iron, printed cottons, silks, and paper. The canal of the Rhine and Rhone, and the railway from Strasbourg to Basel, pass through the department. Capital, Colmar.

HAUTBOY (Fr. *haut bois*, high wood), called also Oboe by the Italians, a musical wind instrument of the reed species, slender at the upper end, but spreading out conically at the lower. Its compass extends from G below the treble clef to G, the 4th line above the staff. It was formerly used chiefly in military music, but is now an indispensable appendage to the orchestra, and derives its name from the piercing character of its sound.

HAUTE-GARONNE (Upper Garonne), a S. department of France, formed from the ancient provinces of Languedoc and Gascony, bounded N. by Tarn-et-Garonne, E. by Tarn, Aude, and Ariège, S. by Spain, and W. by Hautes-Pyrénées and Gers; area, 2,431 sq. m.; pop. in 1856, 481,247. The N. portion is nearly level, but the S. is covered with lofty mountains, mostly spurs from the Pyrénées, one of which, Mont Maladetta, rises to the height of 11,742 feet. The principal rivers are the Garonne, Neste, Salat, Ariège, Lers, Louge, Save, Giron, and Tarn. The climate of the lowlands is in general mild, but that of the mountainous districts is severe in winter. The soil of the valleys and plains is very fertile. The chief vegetable productions are wheat, maize, millet, rye, flax, hemp, potatoes, garlic, fruit, and timber, with which the declivities of the mountains are thickly covered. The quantity of wine annually made averages over 14,000,000 gallons, but the quality is mostly inferior. The department is rich in minerals, iron, copper, lead, antimony, bismuth, zinc, coal, rock crystals, slate, gypsum, marble, and granite being found in abundance. The staple manufactures are coarse woollens, canvas, calico, leather, tinware, earthenware, copperware, scythes, files, mathematical instruments, glass, gunpowder, cannon, tobacco, wine, and brandy. Capital, Toulouse.

HAUTE-LOIRE (Upper Loire), a S. E. department of France, in the ancient province of

Languedoc, bounded N. by Puy-de-Dôme, N. E. by Loire, S. E. by Ardèche, S. W. by Lozère, and W. by Cantal; area, 1,916 sq. m.; pop. in 1856, 300,994. The surface is volcanic, and in general mountainous, being almost everywhere traversed by offshoots of the Cantal or Cévennes chains, the summits of which are covered with snow during a considerable portion of the year, and their declivities with dense forests, extensive pastures, or chestnut woods and vineyards. The loftiest of its peaks is Mont Mezin, 5,820 feet high. The principal rivers are the Loire, Allier, and Lignon. The climate varies with the aspect and elevation of every district. The soil of the valleys and plains is fertile. The chief vegetable productions are wheat, rye, oats, barley, peas, beans, potatoes, fruit, and timber. The quantity of wine annually made averaged about 1,364,000 gallons, but its quality is inferior. The minerals are iron, copper, coal, lead, antimony, chalcodony, diamond, spars, sapphires, amethysts, marble, gypsum, &c. The only important manufactures are silk, thread lace, and ribbons. Capital, Le Puy.

HAUTE-MARNE (Upper Marne), a N. E. department of France, in the ancient province of Champagne, bounded N. by Marne, N. E. by Meuse, E. by Vosges, S. E. by Haute-Saône, S. W. by Côte d'Or, and W. by Aube; area, 2,401 sq. m.; pop. in 1856, 256,512. The surface is generally hilly, and occasionally mountainous. Some of the Langres summits attain an elevation of 2,500 feet. The principal rivers are the Marne, Meuse, and Aube. The climate is mild and healthful in summer, but in winter often very severe in the highlands. The valleys and plains are fertile. The chief vegetable productions are wheat, oats, barley, peas, beans, potatoes, mustard, hemp, fruit, garden plants, and timber, with which more than one third of the department is covered. The quantity of wine annually made averages about 18,000,000 gallons, the surplus of which is mostly exported to Switzerland and the departments of Vosges and Haut-Rhin. The most abundant mineral in this department is iron, for the smelting and manufacture of which it has over 100 furnaces and founderies. The other principal manufactures are cotton and woollen yarn, woollen stockings, leather, gloves, paper, beer, and brandy. Capital, Chaumont-en-Bassigny.

HAUTE-SAÔNE (Upper Saône), an E. department of France, in the ancient province of Franche Comté, bounded N. by Vosges, E. by Haut-Rhin, S. by Doubs and Jura, W. by Côte d'Or, and N. W. by Haute-Marne; area, 2,064 sq. m.; pop. in 1856, 812,897. The surface is in general mountainous, offshoots from the Vosges and Faucilles ranges covering it to a considerable extent. The highest summits are Le Ballon de Serrance and Le Ballon de Lure, the former of which attains an elevation of 8,967 feet, and the latter of 3,718 feet. Its rivers are the Saône and its tributaries, the Coney, Superbe, Lanterne, Oignon, Amance, and Saulon. The climate is more equable than that of the



surrounding departments, and the soil is on the whole fertile. The principal vegetable productions are wheat, rye, maslin (wheat and rye mixed), maize, barley, oats, potatoes, millet, beets, peas, beans, rape, fruit, and timber. The rivers abound with a variety of fish, including trout, carp, pike, barbel, eels, and crawfish. The minerals are iron, coal, porphyry, granite, and gypsum. The staple manufactures are hardware, glass, earthenware, leather, cotton stuffs, paper, brandy, and oil. Capital, Vesoul.

**HAUTE-VIENNE** (Upper Vienne), a W. department of France, in the ancient province of Limousin; area, 2,118 sq. m.; pop. in 1856, 819,787. The surface is diversified with mountains, valleys, and extensive plains. The mountains are connected with those of Auvergne, and form a dividing ridge between the basins of the Loire and the Garonne. Their highest point, the Puy-Vieux, is 8,200 feet in elevation. The Vienne, Thorion, Combade, Briance, Gorre, Gartempe, and Couze are the principal rivers. The soil is not fertile, but good pasturage is abundant, horses, cattle, sheep, &c., are reared, iron, copper, lead, antimony, tin, coal, granite, amethysts, emeralds, &c., are found, and an active manufacturing industry is devoted to iron, steel, copper porcelain, paper, &c. Capital, Limoges.

**HAUTES-ALPES.** See **ALPS**, **HAUTES**.

**HAUTES-PYRÉNÉES** (Upper Pyrénées), a S. W. department of France, in the old province of Gascony, bordering on Spain, and deriving its name from the mountains which bound it on the S.; area, 1,730 sq. m.; pop. in 1856, 245,856. Its surface is broken by numerous offsets of the Pyrénées, between which lie picturesque and fertile valleys, watered by the Larros, the Gave-de-Pau, and other streams. The department has mines of copper, iron, argentiferous lead, manganese, antimony, and zinc, and contains granite, freestone, kaolin, gypsum, and several mineral springs. It produces abundance of fruits, wine, good pasturage, cattle, sheep, and horses, but not enough grain for domestic consumption. The manufactures are not important, and consist chiefly of the woollen stuffs called *barèges*. Capital, Tarbes.

**HAÜY**, RENÉ JUST, a French mineralogist, born in St. Just, in the department of Oise, Feb. 28, 1743, died in Paris, June 3, 1822. He was born of humble parents, but his love for religious music attracted the attention of a priest of his native village, who, after giving him some instruction, procured him a situation in the choir of a church in Paris, whence he went to the college of Navarre and to that of Cardinal Lemoine. In the latter institution, where he became a teacher, he first acquired a love for botany; and accidentally entering the lecture room of Daubenton, he conceived a passion for mineralogy, which shaped his course in life. He was struck with the imperfections of this science, especially in regard to the theories of the persistence of form in mineral substances: the classifications seemed to him cha-

otic confusion. The accidental dropping of a specimen of calcareous spar revealed to him the geometrical law of crystallization, from which arose his most brilliant discoveries. Communicating his discovery to Daubenton, at the suggestion of Laplace, who saw its great importance, he laid it before the academy in 1751. His discovery met with bitter opposition; he was accused of borrowing his ideas from Bergman and of reviving old and exploded theories; but the only answer he made to his detractors was new researches and more careful study. From the date of his memoir on the "schwab" in 1784 commenced a new era in mineralogy; chemistry confirmed the teachings of crystallography, and an entirely new arrangement of minerals was the consequence. During the revolution Haüy, who had received holy orders, was thrown into prison; but the exertions of Geoffroy St. Hilaire obtained his release 2 days before the massacre of Sept. 1792. During the most violent acts of the convulsion he was appointed one of the committee of weights and measures in 1793, and in 1794 keeper of the cabinet of mines. In the latter position he prepared his principal work, *Traité de minéralogie* (4 vols. 8vo., Paris, 1801), of which a portion had been published in a single volume in 1797. It is a complete exposition of the grand idea that the crystalline form should be the principal guide in the determination of mineralogical species, elevating his favorite study at once into the rank of the exact sciences. In Dec. 1802, he was appointed professor of mineralogy in the museum of natural history, and from that time his part of the establishment took a new life. In answer to an application from government to prepare a treatise on physics for colleges, he published in 1805 his *Traité élémentaire de physique*, a work remarkable for its pure and simple style, and well calculated to inspire in youth a love for the natural sciences; it passed through 3 editions. The little emolument accorded to him under the empire he lost under the restoration, and in the latter part of his life he was cramped by the same poverty which he had experienced in youth. Supported by his religious faith, cheered by the attentions of relatives and pupils, and encouraged by the homage of the learned of all nations, the good old man was respected and happy to the last. He died from the effects of a fall, leaving as sole inheritance to his family his magnificent collection of crystals, the fruit of 20 years' labor; it is now preserved, in a room by itself, in the museum of natural history in Paris. His successor in the professorial chair was M. Brongniart, one of his pupils. Among his works, beside those above alluded to, are: *Essai d'une théorie sur la structure des cristaux* (1784); *Exposition de la théorie de l'électricité et du magnétisme* (1787); *De la structure considérée comme caractères distinctifs des minéraux* (1793); *Caractères physiques des pierres précieuses* (1817); and *Traité de cristallographie* (1822). He also contributed

numerous papers to many of the scientific journals of the day. He was a member of the French academy, and of the principal scientific and learned associations of Europe and America.—VALENTIN, a younger brother of the preceding, celebrated as an instructor of the blind, and as the inventor of apparatus for their education, born in St. Just, Nov. 13, 1745, died in Paris, March 18, 1822. He was called in France the "apostle of the blind," and commenced his labors in their behalf in 1784. For an account of his career, and of his efforts in establishing the royal institution for this hitherto neglected class, see BLIND, vol. iii. p. 350.

HAVANA (Span. *San Cristoval de la Habana*), the seat of government of the Spanish colony of Cuba, situated on a fine bay of the gulf of Mexico, on the N. W. coast of the island, and on the edge of the torrid zone, in lat. 23° 9' 4" N. and long. 82° 22' W.; pop. in 1858, according to government statistics, 184,225, though well informed persons estimate it as high as 200,000. It is built on a tongue of land formed by the sea on one side, and the land-locked basin of the harbor on the other. The walls of the city, running from the mouth of the harbor across the peninsula to the inner shore, enclose an ellipse of about 2,000 by 1,100 yards, but at the present time more than twice that space outside of them is compactly covered with buildings. The harbor has a narrow entrance for about half a mile, when it opens into a triple-headed bay containing about 9 sq. m. of surface, with a depth of water varying from 1 to 6 fathoms. For the defence of the city and harbor, there are 6 forts beside the walls and citadel; these are El Moro, La Cabaña, Numero 4, Atares, Principe, and La Punta. The largest of these, La Cabaña, requires a garrison of 2,000 men in time of war. The harbor front of the city is occupied by a continuous quay about 1,000 yards long. Its streets are narrow, but laid out with much regularity; many of them are paved with square blocks of granite, and the principal ones have large subterranean sewers. The city has 2 public markets within and 2 without the walls, which are well supplied with meats, poultry, game, fruits, and vegetables of all kinds, beside an excellent fish market. Its public buildings are not remarkable. The palace of the captain-general and that of the intendant are large plain edifices fronting on the Plaza de Armas; the custom house, fronting on the harbor, is a spacious and solid structure, as is also the deposit warehouse, formerly the convent of San Francisco. It has 6 parish churches beside the cathedral, and 9 others attached to religious orders; 2 theatres, a royal university, a charity hospital, a lying-in asylum, a hospital for lepers, a Magdalen asylum, an orphan asylum, an insane asylum, a *plaza de toros*, and a military hospital. The private dwellings are constructed entirely of stone, in the style of the south of Europe, their chief peculiarity consisting in the immense size of the doors and windows, and the extent of ground which each

house occupies. The city is well lighted with gas, and supplied with water by an aqueduct about 7 m. long, which, beside supplying more than 50 public fountains, is conveyed by pipes into many of the houses. There are two *paseos*, or public promenades, that of Isabel Segunda, laid out in the zone along the walls, which for military reasons has not been built upon, and which now runs through the heart of the city, and the Paseo Militar, running from the outer edge of the city to the foot of the hill of Principe. The first of these is more than a mile in length, laid out with a broad carriage way, with shaded walks on each side, and several fountains and statues; the second is more modest in its arrangement, but on one side of it is laid out the public botanical garden, in which stands the summer residence of the captain-general. Near the Paseo de Isabel Segunda is the Campo Militar, a drill ground for the garrison. There are several other places of public resort, situated on portions of the wall looking over the harbor, among which we may cite the Cortina de Valdes and the Salon O'Donnell. The university of Havana comprises 4 faculties, philosophy, jurisprudence, medicine and surgery, and pharmacy, with 25 professors and 250 students; it has a library of 8,000 volumes, and an anatomical museum, and is supported by a funded revenue of \$30,520, beside fees. There are numerous daily, weekly, and monthly publications; but the press is under a strict censorship, and nothing can be published until every page of the manuscript has the sign manual of the government censor. The climate of Havana is the perpetual summer of the tropics, modified by the cool and moist sea breeze occasioned by the trade winds during the hottest part of the day. The average maximum height of the thermometer during the winter season is 85° F., and in summer 87°. It seldom rises above 90°, and rarely falls below 70°. This latter point is only reached during the gales from the north, which blow at intervals in the months between November and March, when the thermometer occasionally falls as low as 60°. This equable climate makes Havana a delightful resort for northern invalids, but they cannot be too cautious in guarding against the sudden cooling of the atmosphere by the occasional "northers." The nights are always cool and pleasant, and as the sea breeze sinks with the sun, it is gradually replaced by that from the land, which comes laden with aromatic perfumes.—The civilization of commerce has invaded Havana to a greater degree than it has any other Spanish city. In its capacious harbor the flags of all the commercial nations are constantly seen, and among its mercantile establishments American, English, French, German, Dutch, and Belgian, as well as Spanish houses, are found. The mechanical appliances of industry and traffic of other nations have been largely adopted. Railways, steamers, and the electric telegraph connect it with the rest of the island; numerous

banks and insurance companies exist; steam ferries across the harbor, a city railroad, and several omnibus lines exhibit the activity of its internal movement. It imports about 75 per cent. and exports about 45 per cent. of the entire commerce of Cuba. In 1858 there arrived there 958 American vessels measuring 392,972 tons, 658 Spanish vessels measuring 151,027 tons, and of other nations 838 vessels measuring 135,816 tons. The principal exports during the same year were 940,514 boxes and 10,064 hhds. of sugar, 18,415 pipes of rum, 20,483 arrobes of coffee, 21,545 hhds. of molasses, 106,231,000 cigars, and 5,046,896 lbs. of leaf tobacco. Among the imports, provisions constitute the leading articles. In 1858 there were imported 15,873,700 lbs. of jerked beef, 12,852,500 lbs. of salted fish, 249,610 barrels of flour (of which 6,478 barrels were from the United States), 29,009,700 lbs. of rice, 8,704,800 lbs. of lard, 23,088,000 feet of lumber, 434,983 box shooks, 51,908 hogshead shooks, and 80,473 tons of coal. —The fine harbor of Havana was discovered by Sebastian de Ocampo in 1508, who careened his vessels there while circumnavigating the island, and gave it the name of bay of Carenas. As early as 1516 there were a few straggling settlers in the vicinity, and in 1519 the population of the town of San Cristobal, which had been settled some 10 or 12 leagues distant, in the Indian province Habana, on the S. coast of the island, removed to the present site of the city. The conquest of Mexico, and the subsequent development of that rich Spanish viceroyalty, gave an early impulse to the settlement at Havana, which was at once the haven and the outpost of the harborless shore of Mexico. Its geographical position also made it the port of outfit for adventure in North America, and on May 12, 1539, Fernando de Soto sailed from there with 900 infantry and 350 cavalry for Florida. In 1550 the seat of government was transferred to Havana from the city of Santiago de Cuba, which had been till then the residence of the governor. Occasional incursions of the buccaneers gave rise to the first steps for its fortification, and these were continued and extended, principally at the expense of the viceroyalty of Mexico, until it has come to be one of the strongest cities in America. Up to the beginning of the 18th century Havana increased slowly, and its history is eventless. In 1702 the war of Spanish succession gave it some importance, and a fleet was fitted out there to drive the English from the blockade of Pensacola, which was successful. Its value as a naval station began to be developed soon after, and the royal navy yard was founded. In the summer of 1761 the yellow fever first appeared in Havana, supposed to have been brought there by a ship from the East Indies. On June 6, 1762, an English squadron of 32 men-of-war and 200 transports, with 20,000 men under command of the earl of Albemarle, appeared off Havana. Landing about 2 m. E. of the mouth of the harbor, they began a siege, and on Aug. 14 the city sur-

rendered, with a spoil estimated at \$3,000,000. It was held by the captors until July 6, 1763, when it was restored to Spain in compliance with the stipulations of the treaty of Paris. On regaining possession of the city, Spain immediately set about strengthening its defences; and as the revenues of the island at that time barely amounted to \$300,000 per annum, a yearly payment of \$1,200,000 was assigned to it from the treasury of Mexico. By the treaty of Paris Florida was ceded to England, and Louisiana returned by France to Spain. The first of these events gave rise to a Spanish emigration from the continent, which considerably augmented the population of Havana; the second resulted in a remarkable military movement. The French inhabitants of Louisiana having refused to acknowledge the sovereignty of Spain, Count O'Reilly fitted out an expedition of 2,500 men from Havana, with which he occupied New Orleans and reduced Louisiana, annexing it to the captaincy-general of Cuba. On the breaking out of the American revolution Spain reconquered Florida from Great Britain, and on Aug. 8, 1780, concentrated in Havana a powerful expedition consisting of 13 ships of the line, 3 frigates, 4 brigs, and 82 transports with 12,000 troops, known as the "auxiliary army for America." In 1781 an expedition of 13,000 men left Havana for the purpose of co-operating with the French in an attack on Jamaica; and in 1782 a successful expedition of 5 ships of war, 30 transports, and 3,000 men was sent from there against Nassau. A small expedition was sent in 1784 to drive the English from St. Augustine, Florida. In 1795 the revolution of St. Domingo drove more than 12,000 Spanish families from that island to Havana; and on Jan. 15, 1796, the remains of Columbus were brought from the city of St. Domingo and deposited with great pomp in the cathedral. In 1802 a large portion of the French army under Leclerc, driven from Hayti, found a refuge at Havana, where many of them settled. The revolutions of the Spanish colonies on the continent operated to increase with many refugees the population of the city; and during all the long contest of the mother country with the revolted colonies, it was the centre of military and naval operations, being looked upon as the key of America. The gradual subversion of the Spanish rule on the continent brought with it the remains of its forces and its adherents from Mexico and the Spanish main to augment the population of the capital of Cuba. The last military expedition that Spain fitted out there was the disastrous one of Baradas, who with 3,000 men sailed from Havana in May, 1829, to invade Mexico. Thus Havana acquired an importance and a large population from other causes than the development of industry and the growth of commerce. The English occupation of the city and surrounding country in 1763 gave the first impulse to agriculture and trade in Cuba, by opening foreign markets to its products. For a time these were

restrained by the reestablishment of the Spanish colonial monopoly system, but before the close of the last century the necessities of the country had opened a contraband trade with the United States, for provisions and lumber in exchange for sugar and molasses. This was partially authorized by royal decrees issued in the early part of the present century, and in 1818 the port was opened to foreign commerce.

HAVELOCK, HENRY, a British general, born in Bishop Wearmouth, Durham, in 1795, died in Lucknow, India, Nov. 25, 1857. He was educated at the Charterhouse school. In 1818 his father, who had become rich as a ship builder and merchant, lost his property, and the son began the study of the law, but afterward obtained a commission in the army. After serving 8 years in Great Britain, he was sent to India in 1823. In the first Burmese war (1824) Havelock was at the actions at Patunagoo, Pagaban, and Napadee; and at the conclusion of the war he was sent on a mission to the court of Ava, having previously been appointed deputy assistant adjutant-general. In 1827 he published "The History of the Ava Campaigns," which was remarkable for the freedom of its criticisms. In that year he was appointed adjutant of the military depot at Chinsoora, and soon after was married to a daughter of the Rev. Dr. Marshman of Serampore. He subsequently passed his examination in languages at the college, and was appointed adjutant of his corps by Lord William Bentinck. After 23 years' subaltern service, he was promoted in 1838 to a captaincy, and accompanied the army for the invasion of Afghanistan as staff officer of Sir Willoughby Cotton. During this campaign Havelock passed through many extraordinary trials, and was present at some remarkable scenes of Indian military life. In marches through the desert, and amid sufferings by starvation and sickness, he distinguished himself by promoting temperance and encouraging piety. He was at the storming of Ghuznee and the occupation of Cabool, and soon after published his "Narrative of the War in Afghanistan in 1838-'9" (2 vols. 8vo., London, 1840). He afterward distinguished himself in various actions in Afghanistan, and had the chief direction, under Sale, of the defence of Jellalabad. At the battle of Maharajpore, Dec. 29, 1843, during the Mahratta campaign, the personal bravery of Havelock contributed in no small degree to the success of the British arms. Soon afterward the Sikhs revolted and marched with a large army against Ferozepore. The British forces advanced to meet them, and defeated them at Moodkee, and at Ferozepore whither they retreated. There, as well as at the engagement of Aliwal, Havelock gained fresh honors. In 1848 he had been appointed to the rank of Persian interpreter to the commander-in-chief, and brevetted as lieutenant-colonel, and at the conclusion of the Sutlej campaign was appointed deputy adjutant-general at Bombay. Here he remained until 1849, when he went to Europe for his

health. He returned to Bombay in 1851, and became in succession brevet colonel, quartermaster-general (1854), and then adjutant-general. An expedition being sent to Persia in 1856, he was appointed to the 2d division, and commanded the troops at the taking of Mohammerah. He returned to Bombay when peace was concluded, and sailed for Calcutta, but was wrecked on the voyage (April, 1857) off the coast of Ceylon. Reaching Calcutta while the mutiny of 1857 was at its height, he was at once despatched to Allahabad to take command of a column destined for the relief of Cawnpore, which was then besieged by the Nena Sahib. He left Allahabad, July 4, with about 1,200 men, and, having been joined by a reinforcement which raised his strength to nearly 2,000, encountered and routed 3,500 rebels at Futtehpore, and on the 16th defeated the Nena before Cawnpore. The next day he entered the city, to find that it had fallen on June 27, and that the surviving Europeans had been massacred with aggravated atrocities only the day before his arrival. From Cawnpore Havelock followed the Nena to Bittoor, defeated him, and reduced the place to ashes. He then pushed on toward Lucknow, where the garrison under Brigadier Inglis was closely beset by the rebels. Having crossed the Ganges on the 25th, he was opposed at Onao by a large and strongly posted body of the enemy, over whom he gained a victory (July 29) which deserves to rank as one of his most brilliant achievements. On the same day he defeated the mutineers again at Busserut-Gunge; but 2 days afterward, finding his whole force reduced to about 1,300 men, and being incumbered with the sick and wounded, he had to retreat to Mungulwar to wait for reinforcements. The enemy immediately reoccupied Busserut-Gunge, and Havelock returned twice and drove them out. After the third attack upon that town (Aug. 12), he recrossed the Ganges to Cawnpore, having now only 1,000 men, while between him and Lucknow there were at least 3 strongholds defended by 30,000 rebels with 50 guns. Joining Gen. Neill at Cawnpore, he marched against the Nena, who had reentered Bittoor, and routed him, Aug. 16. On Sept. 15, Maj. Gen. Outram reached Cawnpore with 1,700 men. His rank was higher than Havelock's, but he generously relinquished to the latter the chief command, and on the 19th Havelock, raised from the rank of brigadier to that of major-general, again set out for Lucknow, Outram accompanying the force as a volunteer. After a series of battles he reached that city on the 25th, and fought his way with a loss of over 500 men into the residency where Inglis was shut up. Gen. Outram now resumed the command. Under him, gallantly seconded throughout by Havelock, the garrison and their relievers now had to withstand a siege until the arrival of Sir Colin Campbell, who released the British and enabled them to retire to Cawnpore. The residency was evacuated Nov. 22, but Havelock, whose strength had been broken

by sickness and exposure, died of dysentery 8 days afterward at the Dilkoocha palace, on the S. of the city. It is remarkable that Havelock was never wounded in any of his battles, in Burmah, Afghanistan, Gwalior, the Sutlej campaign, Persia, and during the great mutiny, though he was always exposed to the hottest fire, and though he had 4 horses shot under him. He left a younger brother, Charles F. Havelock, who is remarkable for his bravery, having been engaged in every Indian battle from the capture of Bhurtpore to the victory of Guzerat. Previous to his death the commander-in-chief had conferred on Havelock the "good service pension" of £100 a year. A baronetcy having been conferred on him by the queen one day after his death in India, on the news of that event it became evident that the title had fallen to the ground. The queen therefore bestowed the dignity on Henry Marshman Havelock, eldest son of the general, with remainder in default of issue to the heirs male of his father. Few military men were ever more popular in England than Gen. Havelock; and, as an English writer has remarked, "the death of this hero of a series of exploits which form one of the most glorious episodes that even the history of British India contains was more deeply felt in every British home than any event since the death of Nelson."—See "Life of Havelock," by J. T. Headley (New York, 1859).

HAVEN, ALICE BRADLEY, an American authoress, born in Hudson, N. Y., in 1828. Her maiden name was Emily Bradley, and while a school girl she sent under the pseudonyme of Alice G. Lee many attractive sketches to the "Saturday Gazette," then recently established by Joseph O. Neal in Philadelphia. She was married to Mr. Neal in 1846, and at his request assumed and has since retained the name of Alice. On the death of her husband in 1847, she took the editorial charge of the "Gazette," and conducted it for several years, contributing at the same time poems, sketches, and tales to the leading magazines. She published a volume in 1850 entitled the "Gossips of Rivertown, with Sketches in Prose and Verse," and is more generally known by her series of juvenile stories, as "Helen Morton," "Pictures from the Bible," "No such Word as Fail," "Patient Waiting no Loss," "Contentment Better than Wealth," "All's not Gold that Glitters," "Out of Debt Out of Danger," "The Coopers," and others. In 1853 she was married to Mr. Samuel L. Haven, and has since resided in Westchester co., N. Y.

HAVEN, ERASTUS OTIS, D.D., an American clergyman, born in Boston, Mass., in 1820. He was graduated at the Wesleyan university, Middletown, Conn., in 1842, soon after which he entered the ministry of the Methodist Episcopal church, was appointed teacher of natural science in the Amenia seminary, N. Y., and in 1845 was elected principal of that institution. In 1854 he was elected professor of Latin and Greek in the university of Michigan. In 1856

he was elected editor, and returned to Boston to take charge of the "Zion's Herald and Wesleyan Journal," the oldest Methodist newspaper in the world. He is the author of a work entitled "The Young Man Advised" (12mo., New York, 1855), beside reviews, sermons, &c.

HAVEN, NATHANIEL APPLETON, an American lawyer and man of letters, born in Portsmouth, N. H., Jan. 14, 1790, died there, June 3, 1826. He was graduated at Harvard college in 1807, studied law, settled in Portsmouth, indulged a taste for literature, and appeared often as an orator on public occasions. In 1814 he delivered a 4th of July oration at Portsmouth, visited Europe in the following year, in 1816 delivered a Phi Beta Kappa oration at Dartmouth college, and was editor of the "Portsmouth Journal" from 1812 to 1825. On May 21, 1823, he was the orator at Portsmouth at the second centennial celebration of the landing of the first settlers. A selection from his writings, accompanied with a memoir by George Ticknor, was published in 1827.

HAVERCAMP, SIGEBERT, a Dutch philologist and critic, born in Utrecht in 1663, died in Leyden, April 25, 1742. He succeeded Gronovius as professor of Greek at Leyden, and was subsequently appointed to the chair of history and rhetoric. He published editions of Lactantius, Josephus, Eutropius, Sallust, and Censorinus, and a history of Asia, Africa, and Europe, in Dutch, beside many other learned works.

HAVERFORD COLLEGE, an institution of learning under the care of the society of Friends, founded by members of that body in Philadelphia, New York, and New England, and opened in the autumn of 1838. It is situated in the township of Haverford, Delaware co., Penn., on the line of the Pennsylvania railroad, 8 m. N. W. from Philadelphia. The buildings stand on a lawn of 45 acres, laid out with great taste, and adorned with a fine collection of trees and shrubbery. The institution is richly endowed, and furnished with libraries, a chemical laboratory, philosophical apparatus, mineralogical and geological cabinets, and an astronomical observatory. The college admits but about 70 students. Among the early presidents of the college were the late John Gummeré and Daniel B. Smith. The officers of instruction at present are 3 professors, 2 tutors, and an instructor in drawing. Commencement is on the second Wednesday in July, and the first term begins 9 weeks afterward.

HAVERHILL, a township and village of Essex co., Mass., at the head of navigation on the N. or left bank of the Merrimack river, 12 m. W. S. W. from Newburyport at the mouth of the river, and 82 m. N. from Boston; pop. in 1855, 7,940. The village is pleasantly built on a gentle acclivity, and presents with its neat shaded dwellings and background of hills a remarkably attractive appearance. It is the seat of an active manufacturing industry. In 1835 the town had 1 woollen mill, 1 furnace, 1 manufactory of iron railings, 7 of hats and caps, 3

of railroad cars, coaches, &c., 1 of soap and candles, 3 of tinware, 3 of boxes, 2 of patent and enamelled leather, 1 tannery, and 5 currying shops. The amount of capital invested in the above mentioned establishments was \$110,600, beside which there were extensive factories of boots and shoes, employing 6,344 hands, and producing annually nearly \$2,800,000 worth of boots and shoes, last factories, brick and timber yards, gas works, &c., &c. About \$7,000 worth of silver ware was made here; 30 hands were employed in fisheries, and there was a boat building yard. One or two small streams furnish water power. In 1858 the town contained 16 churches (2 Baptist, 1 Christian, 6 Congregational, 1 Episcopal, 1 Freewill Baptist, 1 Methodist, 1 Mormon, 1 Roman Catholic, and 2 Universalist), a high school, a weekly newspaper office, a savings institution, and 4 banks with an aggregate capital of \$680,000. Haverhill is connected by 2 handsome bridges with Bradford on the opposite bank of the river. The Boston and Maine railroad crosses the Merrimack at this point, and connects at Bradford with the Newburyport railroad. The town was settled in 1640, and incorporated in 1645. For a long period it was a frontier town, and suffered severely during the Indian wars.

HAVILAND, JOHN, an American architect and engineer, born in England, Dec. 15, 1792, died in Philadelphia, March 28, 1852. He studied architecture with Elmes in London, subsequently went to Russia with a view of entering the imperial corps of engineers, and in 1816 emigrated to the United States. The Pittsburg penitentiary, one of his earliest works, introduced the radiating form of constructing prisons, which was extensively adopted in the United States and in Europe. Among the principal edifices built after his plans are the halls of justice, better known as the "Tombs," in New York; the U. S. naval asylum in Norfolk, Va. the state penitentiaries of New Jersey, Rhode Island, and Missouri; the U. S. mint and the deaf and dumb asylum in Philadelphia; the Pennsylvania insane hospital at Harrisburg, beside numerous churches and small public buildings.

HAVRE (Fr. *Le Havre*), a fortified seaport of France, capital of an *arrondissement* of the same name in the department of Seine-Inférieure, Normandy, situated on the S. shore of the English channel, on the right bank of the Seine, 134 m. by rail N. W. from Paris, and 55½ m. W. from Rouen; lat. 49° 29' N., long. 6° 37' E.; pop. of the *arrondissement* in 1856, 175,014, and of the town 64,137, including the ancient communes of Ingouville and Graville l'Heure, which were annexed to Havre in 1852. Next to Marseilles it is the principal commercial emporium of France, and has direct communication by steam vessels with Paris, London, Rotterdam, Hamburg, Copenhagen, St. Petersburg, Cadix, Malaga, New York, &c., and by packet ships with Bahia, Vera Cruz, New Orleans, Rio de Janeiro, &c. With the United States the com-

merce is of great magnitude, Havre being to France what Liverpool is to England. It receives the bulk of the American cotton, and ships most of the exports of French goods to the United States. The imports of cotton in 1857 were 431,000, and in 1858 521,000 bales. Those of coals from England\* consisted in 1857 of 547, and in 1858 of 595 cargoes. The number of vessels in the American trade at Havre from March 31 to Sept. 30, 1858, was 141. The number of vessels which arrived in 1858 was 6,673, tonnage 1,050,000, and the registered shipping comprises more than 200 vessels. The aggregate value of the imports and exports in 1857 was \$238,125,000, and the custom house receipts in 1858 amounted to about \$3,000,000. The imports consist chiefly of cotton, spices, coffee, tea, sugar, timber, &c., and the exports of French manufactured goods, of wine, brandy, oil, jewelry, salted meat, butter, cheese, fish, &c. Havre has about 50 vessels employed in the whale fishery, but this business is fast declining. There are manufactories of paper, sugar refineries, an imperial manufactory of tobacco, a cotton factory employing 550 hands, about 12 factories for the manufacture of machinery, a large establishment for the manufacture of salt, &c. The annual value of the manufactures in the *arrondissement* of Havre is estimated at \$12,000,000. The ship yards of Havre produce the best vessels in France. The Vauban dock, with an area of 280,000 square feet, was finished in 1842. The Florida dock, of 75,000 square feet, was finished about the same time. A new dock, called L'Eure, with an area of 700,000 square feet, was finished in 1856, but its wharves are not yet completed. New docks are required to meet the increasing wants of commerce, and another dock of 150,000 square feet was completed in 1859. A dry dock 600 feet long and 120 feet wide is also in course of construction, which will have a capacity for the largest vessels, and obviate the necessity of sending large steamers for repairs to Southampton. The docks accommodate about 500 ships. Havre is much frequented by the Parisians during the season for sea bathing; it has a theatre, an exchange, a chamber of commerce, a merchants' club house, a Lloyd's with the principal European journals, and several churches, including an English chapel and an American church. Napoleon III. has ordered the suppression of the old fortifications and the construction of forts on the heights, which command both the city and the sea. The military quarter of Havre contains an extensive arsenal. The new city hall, which is centrally situated in the Place Napoléon III., is a magnificent edifice, resembling the Tuilleries in the style of its architecture. The adjoining picturesque village of St. Adresse is studded with pretty villas and gardens.—Havre was founded by Louis XII. at the beginning of the 16th century, and consisted then only of a few huts. Francis I. caused it to be fortified, and the construction of a port was begun under his auspices. It was called after him *Ville Française* or *Francis-*

copolla, and afterward, from a chapel of that name, Havre de Grace. The English took Havre in 1562, and bombarded it on several occasions in the 17th and 18th centuries. The extension of the fortifications and of the town generally was ordained by Louis XVI. in 1786, and has since been carried out. Among the eminent persons who were born in Havre are Mlle. Scudéry, Mme. de Lafayette, Bernardin de St. Pierre, and Casimir Delavigne. The principal newspapers of Havre are *Le journal du Havre* and *Le courrier du Havre*, published daily.

HAVRE DE GRACE, a post village of Hartford co., Md., on the W. bank of the Susquehanna river at its mouth, near the head of Chesapeake bay, 86 m. N. E. from Baltimore; pop. in 1850, 1,836; in 1858, about 3,000. The Philadelphia, Wilmington, and Baltimore railroad crosses the river by a steam ferry at this place, which is also the S. terminus of the tide water canal. The construction of the latter work has contributed in an important degree to the prosperity of the village. Havre de Grace has 8 or 4 churches, a newspaper office, a large trade, and valuable fisheries. It was burned by the British during the war of 1812.

HAWAII. See SANDWICH ISLANDS.

HAWES, JOEL, D.D., an American clergyman, born in Medway, Mass., Dec. 22, 1789. He was graduated at Brown university in 1818, and, after studying theology at Andover, was settled in the first Congregational church in Hartford, Conn., in 1818, where he has since been known to the public as an able preacher and writer. His first published work was his "Lectures to Young Men" (Hartford, 1828), originally preached in Hartford and New Haven. They at once met with favor, and about 100,000 copies have been circulated in the United States, and a larger number in Great Britain. A single publisher in Scotland has issued 50,000 copies. Dr. Hawes has also published "Tribute to the Memory of the Pilgrims" (1830); "Mémorial of Normand Smith" (1839); "Character Everything to the Young" (1843); "The Religion of the East" (1845); "Looking Glass for the Ladies, or the Formation and Excellence of Female Character" (1845); "Washington and Jay" (1850); beside numerous occasional sermons in the "National Preacher" and elsewhere, and articles in the various quarterly reviews.

HAWFINCH, a conirostral bird, of the family *fringillida*, and genus *coccothraustes* (Briss.). The common European hawfinch (*C. vulgaris*, Briss.) has a very large bill and head, like other grosbeaks; the neck is short and thick, and the body and limbs proportionally small. In the male the head is yellowish brown, with the throat and space before the eyes black; fore part of back dark chestnut, the rest brownish gray, shading on the upper tail coverts into yellowish brown; wings with purple gloss and white spots; tail black, the outer feathers with a terminal white spot on the inner web, the inner gray toward the end and tipped with white; below pale yellowish brown; under tail

coverts white; the bill flesh-colored, tipped with dusky; the 5th to the 8th primaries have their tips emarginate and the external margins falcate; the 9th, 10th, and 5 of the secondaries are truncated, the inner edge of the tips rounded, and the outer sharp; the tail is short and straight. The female resembles the male, but the colors are paler. The length is about 7 inches, and the extent of wings 11 inches. Specimens are often seen more varied with white. It is a rather handsome bird, found in the mountainous and elevated regions of Europe, and is an irregular visitant of Great Britain. It feeds on the seeds of various trees, especially the hornbeam, plane, pines, and cherry, on the kernels of the haws, plum, &c., on laurel berries, and in the summer on various garden vegetables, particularly green peas. The song is pleasant, but plaintive. The nest is very elaborately constructed, of the usual materials, on the highest branches of trees, and the eggs, 3 to 5, are of a pale olive green, with black spots and irregular streaks of dusky; the young are hatched toward the end of May, and resemble the young green finch; the bill becomes deep blue in the breeding season.

HAWK, a name indiscriminately applied to many birds of the falcon family, of the sub-families *accipitrina*, *buteonina*, *falconina*, and *milvina*—indeed, to almost any bird of prey which is not a vulture, an eagle, or an owl. The duck hawk has been described under *FALCO*, the hen hawk under *HARRIER*, and the fish hawk and goshawk under their respective titles; the white-tailed and swallow-tailed hawks will be noticed under *KITE*, and the pigeon and sparrow hawks in their alphabetical order. The well-known American birds of this name which may be most appropriately noticed here are the following. Cooper's hawk (*accipiter cooperi*, Bonap.) is about 20 inches long, with an extent of wings of 38 inches; the form is more long and slender than in the falcons and goshawk, the wings short, and the tarsi and tail long; the general color above is dark ashy brown, darker on the head; the under parts are transversely barred with light rufous and white; throat and under tail coverts white. It is found generally in the eastern parts of temperate North America, less commonly in the west. The flight is very rapid, and near the ground; it is one of the boldest hawks, attacking birds larger than itself; the ruffed grouse, quails, pigeons, and hares are its favorite food. The sharp-shinned hawk (*A. fluvius*, Gmel.) is a small species, from 11 to 14 inches long, with an extent of wings of 2 feet; the upper plumage is brownish black, tinged with ashy; under parts light rufous, with transverse white bands; the throat and under tail coverts white, the former streaked with black; tail ashy brown, white-tipped, with about 4 brownish black bands. It is found throughout North America from Mexico to the arctic regions; it is one of the swiftest and boldest of the hawks, seizing upon birds and animals which it cannot fly away with; its

flight is low and irregular, and its direction changed with great quickness; it preys also on reptiles.—The red-tailed hawk or buzzard (*Buteo borealis*, Gmel.) is about 2 feet long, with an extent of wings of about 4 feet; the color above is dark brown, with lighter edgings; tail bright rufous, narrowly tipped with white and a subterminal black band; upper tail coverts yellowish white with brown spots and bands; beneath pale yellowish white, with longitudinal lines and spots of fulvous brown; throat white, with narrow brown stripes; tail below silvery white. The body is large and muscular. Like other buzzards, it protrudes the claws beyond the head in seizing prey; the flight is slow and sailing, at a moderate height, accompanied by a mournful cry; after seeing its prey, it generally alights on a tree, from which it descends with great rapidity and rarely failing accuracy. It preys upon hares, squirrels, grouse, and smaller birds; it frequently visits the poultry yard in search of chickens, goslings, &c., and is consequently often called hen hawk by the farmers; it is very difficult to approach with a gun. The red-shouldered hawk (*B. lineatus*, Gmel.) is about 20 inches long, with an extent of wings of about 3½ feet; its specific mark is the bright rufous color of the lesser wing coverts; the upper parts are brown, mixed with rufous on the head and with white spots on the wings; under parts pale orange rufous, with white spots and bars; tail brownish black, with about 5 bars and a tip of white. The young birds, described as the winter hawk (*B. hyemalis*, Gmel.), are yellowish white below, with dark brown spots and stripes; ash brown above, white-spotted; tail ash brown, silvery white below, and with numerous pale brownish and rufous white bands above. This hawk is found abundantly east of the Rocky mountains, being replaced to the westward by the *B. elegans* (Cassin), in which the under parts are much darker red. It prefers woods, in which it finds squirrels, hares, grouse, and other animals of similar size; it is one of the most noisy of the genus. The broad-winged hawk (*B. pennsylvanicus*, Wilson) is about 17 inches long, with an extent of wings of 3 feet; the color above is umber brown, the feathers white at the base on the hind neck; throat white, with brown streaks; breast with band and spots of dusky ferruginous; rest of under parts white, with reddish spots on the sides; tail dark brown, narrowly tipped with white, with one wide and several narrower bands of white near the base. It is found in eastern North America; its flight is easy and performed in circles, and often in a gliding manner for a short distance with closed wings; it feeds upon small quadrupeds, birds, and reptiles, and sometimes on insects; it rarely secures birds on the wing.—The rough-legged hawk (*archibuteo lagopus*, Gmel.) is about 23 inches long, with an extent of 4½ feet; the wings are long, the tail short, the tarsus densely feathered in front to the toes, and body robust; the upper parts are generally dark brown, much lighter on the head,

with a white patch on the latter; under parts white, with stripes and spots of brown; tail white at the base, with a wide subterminal band of black, and 2 others alternating with 2 of light cinereous. It inhabits all of temperate North America, and cannot be distinguished, according to Baird, from the European rough-legged species. It flies slowly, sailing often in circles; its habits and food are as in the species above described. The black hawk (*A. sancti johannis*, Gmel.) is a little larger than the last, and, in the adult plumage, of a glossy black color, often with a brown tinge, and with white spots on the forehead, throat, and occiput; tail with a well defined white bar, and irregularly marked with the same toward the base; inner webs of quills white, conspicuous from below during flight; tarsi densely feathered in front. It is found in the eastern and northern parts of America; chocolate brown specimens are frequently met with.—The young of all these hawks differ greatly from the adults, having generally a much lighter and white-mixed plumage. The keenness of vision of these birds, sweeping with great rapidity, and often at a considerable height above their prey, is remarkable; to have a "sight like a hawk" has become a proverb. They usually fly low, irregularly, and with sudden change of course, for which their short wings and long tails are well adapted; the falcons, on the contrary, have longer wings and shorter tails, and fly with greater regularity and at considerable elevation, from which they descend with exceeding swiftness; the kites have both the wings and tail elongated, with a corresponding power of rapid and high flight, and the ability of very sudden descent and change of direction. Hawks, and indeed birds of prey generally, are almost always shot at when they come within range of a gun, without any particular reason, except that they are hawks, and of a ferocious disposition; they do no great mischief beyond the occasional stealing of a chicken, hare, grouse, or pigeon, which otherwise would fall a victim to man's appetite; and they are of positive advantage to the agriculturist by destroying animals and birds injurious to vegetation, and noxious reptiles.

HAWK MOTH, the proper name of the 2d or crepuscular division of the order *lepidoptera*, corresponding to the old genus *sphinx* (Linn.), most conveniently divided into the sections of sphinxes, aegerians, and glaucopidians. For the characters of the order both in the perfect and immature state, see BUTTERFLY, and CATERPILLAR. The hawk moths have the antennae fusiform or thickest in the middle, and generally hooked at the tip; the comparatively narrow wings are retained in a horizontal or slightly inclined position by a bristle or bunch of stiff hairs on the shoulder of each hind wing, which is received by a hook on the under side of each fore wing, the upper ones covering the lower; there are 2 pairs of spurs on the hind legs. Most of these insects fly in the morning and evening twilight, though a few appear by day.



Linnaeus gave the name of *sphinx* to this group from a fancied resemblance of some of their caterpillars, when at rest, to the Egyptian figure; supporting themselves on the posterior pairs of legs, they raise the fore part of the body, and remain fixed in this position for hours at a time. The adult sphinxes are generally called humming-bird moths from the noise they make when flying, and hawk moths from their hovering and powerful flight; the body is thick and robust, and the strong wings long, narrow, and pointed; with their very long tongues they obtain honey from flowers while on the wing; many are of such size, and with such brilliant colors, that they might readily be taken for humming birds. Some of the ægerians also fly by day; though their flight is swift, it is not prolonged, and they generally alight while feeding; they much resemble bees and wasps; they have a tuft at the end of the body which can be extended like a fan. The glaucopidians, so named from the bluish color of the eyes in some of the species, have the antennæ feathered on each side; they fly mostly by day, and alight to take their food. The large green caterpillar, with a horn on the top of the last segment, commonly called potato worm, is a good example of the larva of the sphinx moth. In this division all have 16 legs, in pairs beneath the 1st to 3d and 6th to 10th or last segments of the body; and all, except the ægerians and glaucopidians, have a horn or tubercle on the top of the last segment. The sphinx caterpillars devour the leaves of plants on which they are found. The caterpillars of the ægerians are called borers, in common with the larvæ of other orders of insects, from their living concealed within the stems or roots of plants, and feeding upon their interior substance; they are soft, whitish, and slightly downy; they make a cocoon of bits of wood cemented by gummy matter, within which they are transformed into chrysalids; these are of a shining bay color, having the edges of the abdominal segments armed with rows of short teeth, by means of which they work out of the cocoon and out of the hole in the wood. The caterpillars of the glaucopidians are slender, with a few scattered hairs or tufts; they eat the leaves of plants, and undergo transformation in cocoons of coarse silk; the chrysalids are round at one end, tapering at the other, without teeth on the surface; they much resemble the nocturnal moths. The potato worm, or larva of the *sphinx quinquemaculatus*, with oblique whitish stripes on the sides, grows to a length of 3 or 4 inches and of the thickness of the finger; it attains its full size toward the end of August, and often injures the plant by devouring the leaves; crawling into the ground, it remains a chrysalis during the winter, and in the following summer comes out a large moth, measuring 5 inches across the wings; the color is gray, with blackish lines and bands, and 5 round orange spots encircled with black on each side of the body; the tongue, which when not in use is coiled

like a watch spring, may be unrolled to a length of 5 or 6 inches. The elm is infested with a pale green caterpillar, about  $3\frac{1}{4}$  inches long, with 7 oblique white lines on each side, a row of little notches on the back, and 4 short notched horns on the shoulders; this is the larva of a sphinx (*ceratomia quadricornis*, Harris), and sometimes commits considerable mischief during July and August; these larvæ pass the winter in the earth, and come out in the following June large moths, with an expanse of wings of nearly 5 inches; the color is light brown, varied with darker and with white, with 5 longitudinal dark brown lines on the hind part of the body. This caterpillar is easily caught in the morning during the season of maturity. Grape and other vines are attacked by the larvæ of the *astellitis* and *achemon* hawk moths, the moth of the former being of a light olive color and expanding 4 or 5 inches, the latter reddish ash, with brown patches on the thorax and anterior wings, and expanding 3 or 4 inches. For details on other sphinxes injurious to vegetation, see the work of Dr. T. W. Harris, "On Insects Injurious to Vegetation." The sphinx caterpillars, being of large size and full of juices, are commonly chosen by the ichneumon flies as the nidus in which to deposit their eggs, the larvæ from which, feeding on the substance of the caterpillar, and frequently spinning their cocoons in great numbers on the outside, so reduce it that the metamorphoses do not take place; many are destroyed in this way. Ash trees and cucurbitaceous vines suffer much from the boring larvæ of ægerians; the former from the *trochilium dentatum* (Harris), of a brown color, with yellow markings, expanding about  $1\frac{1}{2}$  inches; the latter from the *ægeria cucurbita* (Harris), with an orange-colored body spotted with black, and its fore wings expanding about  $1\frac{1}{2}$  inches. Peach and cherry trees throughout the United States have of late years been infested with a naked whitish borer, the *ægeria exitiosa* (Say); the perfect insect is a slender dark blue moth, the males being much the smaller, and differing considerably in marking from the females. For an account of these insects, and the best ways of preventing their ravages, see Dr. Harris's papers in vols. v. and ix. of the "New England Farmer." The glaucopidian moth (*procris Americana*) is in some years very injurious to vines, stripping off the leaves in midsummer. Its wings are very narrow, expanding about an inch; the color is blue black, with a saffron collar; the caterpillars are yellowish, with black velvety tufts on each ring, and a few hairs on the end of the body. They are about  $\frac{1}{4}$  inch long, gregarious, and rather sluggish in their motions; in the southern states several broods are hatched in a season. For a full account see "Hovey's Magazine" for June, 1844. Many species of all these sections are found in Europe, where their habits have been carefully observed.

HAWKE, EDWARD, baron, an English admiral, born in 1715, died in Shepperton, Middlesex,

Oct. 16, 1781. He entered the navy at a very early age, and in 1784 had risen to the command of the *Wolf*. Ten years later he was present at the naval battle of Toulon between the English fleet under Admirals Lestock and Rowley and the combined French and Spanish fleets, on which occasion his ship, the *Berwick*, broke from the line of battle, and captured the Spanish ship *Padre*, of superior force, the only prize made by the English. But as this act of heroism involved a disobedience of orders, Capt. Hawke was tried and dismissed from the service, to which, however, he was immediately restored by George III., who thenceforth called him his own admiral. In 1747 he was made rear admiral of the white, and on Oct. 14 of the same year gained a complete victory over a French squadron off Belleisle on the coast of France. In 1756 he was appointed to supersede Admiral Byng in the Mediterranean, and subsequently was employed in blockading the French ports in the bay of Biscay. In April, 1758, he drove a French armament destined for America on shore in the Basque roads. In Nov. 1759, he attacked the French fleet under Conflans in Quiberon bay in the midst of a storm, and, after a memorable and extremely perilous action, the ships being closely engaged among the breakers on the coast, destroyed or captured several of the enemy's vessels, thus preventing the projected invasion of England. For these services he received the thanks of parliament and a pension of £2,000. In 1765 he was appointed vice-admiral of England and first lord of the admiralty, and in 1776 was created Baron Hawke of Towton, in Yorkshire.

HAWKESWORTH, JOHN, an English author, born in London in 1715 or 1719, died Nov. 17, 1773. He was apprenticed to a clockmaker, and afterward seems to have entered an attorney's office, which he quitted to indulge in literary pursuits. In 1744 he succeeded Dr. Johnson as compiler of parliamentary debates for the "*Gentleman's Magazine*," to which he also contributed from time to time a number of poetical pieces. In 1752 he began in concert with Dr. Johnson and Thornton a series of papers called the "*Adventurer*," on the plan of the "*Rambler*." Warton became one of the corps of writers in the following year. This periodical was published twice a week, and ran through 140 numbers, of which 70 were by Hawkesworth. They were very successful, and beside increasing his reputation, procured him from the archbishop of Canterbury the Lambeth degree of LL.D., an honor which so turned his head that he quarrelled with Johnson and some others of his best friends. This, however, did not deter Dr. Johnson from commending, in his "*Lives of the Poets*," Hawkesworth's edition and life of Swift, which was published in 1765. In the same year he accepted the post of critic in the "*Gentleman's Magazine*," and retained it until 1772, when he was selected, on the recommendation of Garrick, to prepare for publication, at the cost of the

government, an account of Cook's voyage to the South seas. The work appeared in 1778, in 8 vols. 4to., illustrated with maps and cuts, and comprised, beside a digest of Cook's papers, a narrative of the previous voyages of Byron, Wallis, and Carteret. It had a ready sale, and the editor received £6,000 for his labor; but he was charged with covertly attacking Christianity in certain passages of his preface, and indulging in immoral descriptions. Ohagrin at these censures has been said, without much probability, to have hastened his death. Dr. Hawkesworth adapted several pieces for the Drury Lane stage, and is also known as the author of "*Zimri*," an oratorio (1760); "*Edgar and Emmeline*," a fairy drama, acted with great success at Drury Lane (1761); "*Almorán and Hamet*," an eastern tale (1761); and a translation of Fénelon's *Télémaque*, still esteemed the best English version (1768).

HAWKING. See FALCONRY.

HAWKINS, a N. E. co. of Tenn., bordering on Va., drained by Holston river, and bounded N. W. by Clinch mountain; area, 710 sq. m.; pop. in 1850, 12,770, of whom 1,690 were slaves. The Holston is here navigable by steamboats. Limestone is abundant, and the valleys are fertile. The productions in 1850 were 550,186 bushels of Indian corn, 43,881 of wheat, 140,787 of oats, 13,804 of sweet potatoes, and 125,064 lbs. of butter. There were 45 grist mills, 2 saw mills, 8 tanneries, 1 newspaper office, 30 churches, and 4,442 pupils attending public schools. Capital, Rogersville.

HAWKINS, SIR JOHN, an English navigator, born in Plymouth about 1520, died in the West Indies, Nov. 21, 1595. He was the son of William Hawkins, a sailor. In his youth he made several voyages to Spain, Portugal, and the Canary islands, and was engaged for some years in the slave trade with the Antilles, New Granada, Mexico, Florida, and Virginia. The first adventure from England in this traffic was made by Hawkins in 1562, when he sailed with a small squadron for the coast of Guinea. There he obtained 800 blacks, whom he sold advantageously in Hispaniola (Hayti), and with the profits of this sale was enabled to fit out a second and larger enterprise for the same purpose in 1564. In the following year Queen Elizabeth granted him permission to wear as his crest "a demi Moor in his proper color, bound and captive." He made a third voyage in 1567, for which he received assistance from the queen, and with 500 negroes sailed from Guinea to Spanish America. All trade between the Spanish settlements and foreigners having been prohibited, he found himself unable to dispose of his cargo, and, indignant at the refusal of the governor of Rio de la Hacha to trade with him, he took possession of the town. He then sailed to Carthage and sold his slaves, but soon after leaving that place he was attacked by the Spanish fleet in the bay of San Juan de Ulloa, Mexico, and escaped with but two vessels, with which he made his way home to

England, arriving in Jan. 1568. This loss seems to have disheartened him, and he made no more commercial voyages. In 1578 Elizabeth appointed him treasurer of the navy. He served in 1588 as rear-admiral against the Spanish armada, on board the frigate *Victory*, and was knighted for his services on this occasion. In 1590 he was sent with Sir Martin Frobisher to intercept the Plate fleet, and at the same time to harass the trade of Spain, but was successful only in the latter object. In 1595 he commanded, in conjunction with his kinsman Drake, an expedition against the Spanish possessions in the West Indies. The two commanders quarrelled and separated, the attacks upon Dominica and Porto Rico were repulsed, and Hawkins died at sea, either from a wound or vexation. He was an able seaman, bold in conceiving enterprises, and brave in carrying them out, but rude in manners, cunning, and avaricious. He was twice returned as a member of parliament for Plymouth, and once also for another place. He founded at Chatham a hospital for disabled and infirm seamen.

HAWKINS, SIR JOHN, an English author, born in London in 1719, died May 21, 1789. He was articled to an attorney, but devoted his leisure to literature and the cultivation of music. He subsequently amassed a handsome fortune in the practice of his profession. In 1741 he joined the madrigal society, and soon after gained considerable reputation by the publication of several sets of madrigals, for which he furnished the words. In 1749 he was admitted a member of Dr. Johnson's club, and was thenceforth on terms of intimacy with the great lexicographer. Retiring from business in 1759 with a fortune much increased by marriage and by legacies, he was appointed a magistrate for the county of Middlesex. About 1760 he began to collect materials for a history of music, which after 16 years of labor was published in 5 vols. 4to. under the title of "General History of the Science and Practice of Music." It suffered somewhat in competition with Dr. Burney's history, published about the same time, and was attacked with much acrimony by the press, which had previously been secured in favor of the latter work; but the value of the information which it contains is beyond all question, and it fairly supplies in learning what it lacks in elegance of style. A new edition, with an index, was published in 1853 (3 vols. 4to., London). The library which he had accumulated in the preparation of this work he presented to the British museum. He also published an edition of Walton's "Complete Angler," and a memoir of Dr. Johnson, whose works he edited in 11 volumes.

HAWKS, FRANCIS LISTER, D.D., LL.D., an American clergyman and author, born in Newbern, N. C., June 10, 1798. He was graduated at the university of North Carolina in 1815; studied law, and was admitted to the bar at the age of 21, and practised for several years in North Carolina. At the age of 28 he was elect-

ed to the legislature of his native state, but his inclination and his earnest religious convictions led him to devote himself to the ministry in the Protestant Episcopal church. He was accordingly, after suitable theological preparation, ordained in 1827, by Bishop Ravenscroft of North Carolina. He officiated for a brief period in New Haven, Conn., as assistant to Dr. Harry Crosswell; and in 1829 he became assistant minister of St. James's church, Philadelphia, of which Bishop White was rector. Early in 1831 he became rector of St. Stephen's church, New York, which post he resigned at the close of the year. He was then called to St. Thomas's church, New York, of which he continued rector until 1843. At the general convention of 1835, Dr. Hawks was appointed to the missionary bishopric of the South-West, at the same time that Bishop Kemper was put in charge of the North-West; but no provision being made for his support, he declined the appointment. Having been requested to act as historiographer of the American Episcopal church, Dr. Hawks, under the authority of the general convention, went to England and obtained copies of a number of valuable and important papers relating to the early history of Episcopacy in America. In 1837, in conjunction with Dr. Henry, he founded the "New York Review," of which he was for some time editor and a principal contributor. About the same date he founded St. Thomas's hall, at Flushing, L. I., a school for boys intended ultimately for the special benefit of the sons of the clergy; but in a few years it was closed on account of financial difficulties, leaving Dr. Hawks deeply in debt. In the autumn of 1843 he removed to Mississippi, of which diocese he was elected bishop by the convention in the same year; but when, according to the canon of the Episcopal church, the election came for approval before the house of clerical and lay deputies assembled at the general convention of 1844, strong opposition was made, based on charges connected with the difficulties and embarrassments of St. Thomas's hall. The speech of Dr. Hawks in vindication of himself was eloquent and convincing; a vote of acquittal was passed, and the whole matter was referred back to the diocese of Mississippi, which expressed its entire confidence in Dr. Hawks, but he declined accepting the bishopric. At the close of 1844 he removed to New Orleans, where he became rector of Christ's church. He remained in this position 5 years, during which he was elected president of the university of Louisiana. At the request of friends in New York, Dr. Hawks returned to that city in 1849, a bonus of \$15,000 having been offered to him, by using all of which he was enabled to extricate himself from his pecuniary embarrassments. He now became rector of the church of the Mediator, which was soon after merged into Calvary church. Dr. Hawks then became rector of Calvary—at the time deeply in debt, but now free from it—and still remains in that position

(1859). In 1854 he was elected bishop of Rhode Island, but he declined the appointment. His contributions to literature and science have been very numerous. Among his most important works are: "Reports of Cases adjudged in the Supreme Court of North Carolina, 1820-'26" (4 vols. 8vo., Raleigh, 1828-'8); "Digest of all the Cases Decided and Reported in North Carolina;" "Contributions to the Ecclesiastical History of the United States" (2 vols. 8vo., embracing Virginia and Maryland, New York, 1836-'41); "Egypt and its Monuments" (8vo., 1849); "Anticrural Confession in the Protestant Episcopal Church" (12mo., 1850). Dr. Hawks has translated Rovero and Tschudi's "Antiquities of Peru" (1854), and has edited the "Official and other State Papers of the late Maj. Gen. Alexander Hamilton" (8vo., 1842); the "Romance of Biography," in a series of 12mo. volumes; "Appleton's Cyclopædia of Biography" (New York, 1856); and, under the pseudonym of "Uncle Philip," several volumes of juvenile works for Harper's "Boys' and Girls' Library." He compiled from Perry's original notes and journal the "Narrative of Commodore Perry's Expedition to the China Seas and Japan in 1852-'4" (8vo. and 4to., 1856), and has contributed to various periodicals. The 1st and 2d vols. of his "History of North Carolina," upon which he has long been engaged, appeared in 1857-'8 (8vo., Fayetteville); and it is understood that he has in preparation a work on the ancient monuments of Central and Western America, and a physical geography.

**HAWKSMOOR, NICHOLAS**, an English architect, born in 1666, died in 1736. He was a pupil of Sir Christopher Wren, after whose death he was surveyor of Westminster abbey, and designed many of the new churches erected in pursuance of the statute of Queen Anne for building 50 new churches. He was also said to be associated with Sir John Vanbrugh in building Castle Howard and Blenheim.

**HAWKWOOD, SIR JOHN**. See ACUTO, GIOVANNI.

**HAWLEY**, a post village of Wayne co., Penn., on the railroad of the Pennsylvania coal company, which here connects with the Delaware and Hudson canal, 8 m. from Honesdale; pop. in 1853, about 3,000. It has grown up almost wholly since 1848, and owes its importance to the canal and railroad, over which large quantities of coal are transported.

**HAWLEY, GIDEON**, an American missionary to the Indians, born in Stratfield, now Bridgeport, Conn., Nov. 5, 1727, died in Marshpee, Mass., Oct. 3, 1807. He was graduated at Yale college in 1749, and commenced his labors at Stockbridge in 1752, opening a school at that place, in which he instructed a number of Mohawk, Oneida, and Tuscarora families. In 1754, under the patronage of Sir William Johnson, he began a mission among the Iroquois, or Six Nations, on the Susquehanna river; but in 1756 he was obliged by the disturbances of the French war to leave that region, when he be-

came a chaplain in the army marching against Crown Point. The campaign being over, he reëngaged in his missionary work at Marshpee, where he was installed as pastor in 1758, and there passed the remainder of his life in his benevolent labors.

**HAWLEY, JOSEPH**, an American patriot and statesman, born in Northampton, Mass., in 1724, died March 10, 1788. He was graduated at Yale college, and followed the profession of the law at Northampton, in which he rose to great eminence. At the time of the disputes between Great Britain and America, he took a prominent part in advocating the cause of the colonies. "We must fight," he wrote to the delegates of Massachusetts, "if we cannot otherwise rid ourselves of British taxation. The form of government enacted for us by the British parliament is evil against right, utterly intolerable to every man who has any idea or feeling of right or liberty." He was several times elected a member of the council, but declined, preferring to occupy a seat in the state legislature, of which from 1764 until 1776 he was an influential member. In the latter year, on account of failing health, he withdrew from all public employments. From a violent opposer of the ecclesiastical measures of Jonathan Edwards, whose removal from Northampton he had been active in effecting, he became his warm advocate, and in 1760 wrote a remarkable letter deploring his part in the affair.

**HAWTHORN**. See THORN.

**HAWTHORNE, NATHANIEL**, an American author, born July 4, 1804, in Salem, Mass., where his ancestors, who came from England, had settled in the early part of the 17th century. The Hawthornes in that century took part in the persecution of the Quakers and the witches. For a long period the men of the family followed the sea; "a gray-headed shipmaster in each generation retiring from the quarter-deck to the homestead, while a boy of 14 took the hereditary place before the mast, confronting the salt spray and the gale, which had blustered against his sire and grandsire." The father of Nathaniel Hawthorne was a shipmaster who died of yellow fever at Havana about 1810. His mother, whose maiden name was Manning, was a woman of great beauty and extreme sensibility. Her grief at her husband's death was hardly mitigated by time, and for the rest of her life she lived a mourner in absolute seclusion. At the age of 10, on account of feeble health, Nathaniel Hawthorne was sent from Salem to live on a farm belonging to his family on the borders of Sebago lake in Maine. He returned to Salem for a year to complete his studies preparatory to entering Bowdoin college, where he was graduated in 1825 in the same class with George B. Cheever and Henry W. Longfellow. Franklin Pierce, who was in the preceding class, was his intimate friend. After quitting college he resided many years in Salem, leading a solitary life of meditation and study, a recluse even from his own household,

walking out by night and passing the day alone in his room, writing wild tales, most of which he burned, and some of which, in newspapers, magazines, and annuals, led a wandering, uncertain, and mostly unnoticed life. In 1832 he published in Boston an anonymous romance which he has never since claimed, and which the public have not been able to identify. In 1837 he collected from the annual called "The Token" and from other periodicals a number of his tales and sketches, and published them at Boston under the title of "Twice-Told Tales." The book was noticed with high praise in the "North American Review" by Mr. Longfellow, who pronounced it the work of a man of genius and of a true poet, but it attracted little attention from the general public. Gradually, however, it found its way into the hands of the more cultivated and appreciative class of readers; and in 1842 a new edition was issued, together with a second series of tales collected from the "Democratic Review" and other magazines. These volumes, says Mr. George W. Curtis, are "full of glancing wit, of tender satire, of exquisite natural description, of subtle and strange analysis of human life, darkly passionate and weird." In 1838 Mr. Bancroft the historian, then collector of the port of Boston, appointed Mr. Hawthorne a weigher and gauger in the custom house. "From the society of phantoms he stepped upon Long Wharf, and plumply confronted Captain Cuttle and Dirk Hatterick." He fulfilled his novel duties well, was a favorite with the sailors, it is said, and held his office till after the inauguration of President Harrison in 1841, when, being a democrat, he was displaced to make room for a whig. After leaving the custom house he went to live with the association for agriculture and education at Brook Farm in West Roxbury, Mass., of which he was one of the founders. He remained here a few months, "belaboring the rugged furrows;" but before the year expired he returned to Boston, where he resided till 1843, when he married and took up his abode in the old manse at Concord, which adjoins the first battle field of the revolution, a parsonage which had never before been profaned by a lay occupant. In the introduction to the volume of tales and sketches entitled "Mosses from an Old Manse" (New York, 1846), he has given a charming account of his life here, of "wild, free days on the Assabeth, indulging fantastic speculations beside our fire of fallen boughs, with Ellery Channing, or talking with Thoreau about pine trees and Indian relics in his hermitage at Walden." These "Mosses" were mostly written in the old manse, in a delightful little nook of a study in the rear of the house, from whose windows the clergyman of Concord watched the fight between his parishioners and the British troops on April 19, 1775. In the same room Emerson, who once inhabited the manse, wrote "Nature." Mr. Hawthorne resided in Concord for 8 years, mingling little with the society of the village, and seeking solitude in the

woodland walks around it, or in his boat in the beautiful Assabeth, of which, in his "Mosses," he says: "A more lovely stream than this for a mile above its junction with the Concord, has never flowed on earth—nowhere, indeed, except to lave the interior regions of a poet's imagination." In 1846, the democrats having returned to power, Mr. Polk being president, and Mr. Bancroft secretary of the navy, Mr. Hawthorne was appointed surveyor of the port of Salem. He carried his family thither, and for the next 8 years he was the chief executive officer in the decayed old custom house, of which and its venerable inmates he gave a graphic and satirical sketch in the introduction to the "Scarlet Letter" (Boston, 1850), a powerful romance of early New England life, which became at once exceedingly popular, and established for its author a high and wide-spread reputation. In 1849, the whigs having regained control of the national government, Mr. Hawthorne was again removed from office. He quitted Salem, and, retiring to the hills of Berkshire, settled in the town of Lenox in a little red cottage on the shore of the lakelet called the Stockbridge Bowl. Here he wrote the "House of the Seven Gables" (Boston, 1851), a story the scene of which is laid in Salem in the earlier part of the present century. It was not less successful than the "Scarlet Letter," though its striking and sombre effect is wrought out of homely and apparently commonplace materials, and its strain of horror is prolonged almost to tediousness. This was followed by the "Blithedale Romance" (Boston, 1852), in which, as he says in the preface to the book, he "has ventured to make free with his old and affectionately remembered home at Brook Farm, as being certainly the most romantic episode of his own life." The characters of the romance, he says, are entirely fictitious, though the scene of Brook Farm was in good keeping with the personages whom he desired to introduce. "The self-conceited philanthropist; the high-spirited woman bruising herself against the narrow limitations of her sex; the weakly maiden, whose tremulous nerves endow her with sibylline attributes; the minor poet, beginning life with strenuous aspirations, which die out with his youthful fervor; all these might have been looked for at Brook Farm, but, by some accident, never made their appearance there." In 1852 Mr. Hawthorne removed from Lenox to Concord, where he purchased a house and a few acres of land, and has made his permanent home. During the presidential canvass of 1852 he published a life of his college friend Franklin Pierce, the democratic candidate. President Pierce in 1858 appointed his biographer to one of the most lucrative posts in his gift, the U. S. consulate at Liverpool. Mr. Hawthorne held this office till 1857, when he resigned it, and has since been travelling with his family in various countries of Europe. Beside the works we have mentioned, Mr. Hawthorne has published "True Stories from History and Biography" (Boston,

1851); "The Wonder Book for Girls and Boys" (1851); "The Snow Image and other Twice-Told Tales" (1852); and "Tanglewood Tales," a continuation of the "Wonder Book" (1853)—each in 1 vol. 12mo. In 1845 he edited the "Journal of an African Cruiser" (New York, 1845), from the MSS. of a naval officer, Lieut. Horatio Bridge. He now has a novel ready for the press which is announced to be published in Boston toward the end of the present year (1859).

HAY, DAVID RAMSAY, a Scottish artist and author, born in Edinburgh in 1798. His first employment was that of reading boy in a printing office; but having shown a taste for drawing, he was placed at 14 years of age with a house painter, who instructed him in the rudiments of the trade. He next set about painting and copying pictures, and having attracted the notice of Walter Scott, was advised by him to devote himself to decorative house painting. Scott subsequently employed him under his personal supervision to decorate Abbotsford. He has written many works on the principles and processes of art.

HAYDN, JOSEPH, a German composer, born in Rohrau, Lower Austria, March 31, 1782, died in Vienna, May 31, 1809. He was the eldest of the 20 children (by two mothers) of Matthias Haydn, a wheelwright. The father, in the course of his experience as a travelling journeyman, had picked up some small skill in playing the harp at Frankfort-on-the-Main, and stored his memory with songs; his wife too was a singer. Matthias Haydn, though poor, was a man of sufficient mark in Rohrau to be elected its *Marktrichter*. In his 5th year little Joseph's musical talents attracted the notice of Frank, a distant connection of the family and school teacher in the neighboring town of Haimburg, who advised the parents to give their son a musical education. When 6 years old Joseph was sent to the school at Haimburg, where he learned reading, writing, singing by note, and all the instruments then usual in orchestras which his childish strength and members would admit of his playing. His first instrument was the drum. He had come to Haimburg at a season of numerous religious processions, and the drummer had just died. Frank gave the child a lesson or two, and a few days after the people of the town laughed to see their processions led by a boy of 6 years beating a drum, which, he being too small to carry it, was mounted upon a hump-backed dwarf. His voice proved to be one of remarkable power, sweetness, and compass, and attracted the notice of the parish priest, who afterward recommended him to Reuter, chapel-master of the cathedral of St. Stephen's in Vienna, as a choir boy. Reuter examined him, gave him a single lesson in the execution of the shake or trill, ordered him to practise singing the scale daily, and as soon as he was eligible, at 8 years of age, received him into the choir. The number of boys in the choir was 6, for the support and instruction of each of whom Reuter

received 700 florins (about \$300), a sum amply sufficient in those days (1740) for their handsome support, and to furnish them with the best teachers. In the case of the boy Haydn, and doubtless of the others, a large proportion of the 700 florins went into Reuter's pocket; for with the exception of a little Latin and much practical music, Joseph seems to have been taught nothing. In the theory and science of the art he received in 8 years but two lessons from his master. His physical wants were as ill supplied as those of his mind. Hunger during these years was a spur to him in the study of singing, he having early learned that his beautiful voice could be made to procure him food. Constant practice in singing the music of the best Italian and German ecclesiastical composers made up in some measure the want of adequate instruction in musical theory; his natural instinct for correct harmony and counterpoint being developed in spite of his ignorance of rules. Even in those years he was an industrious composer, and was once surprised by Reuter in attempting a complicated *Salve Regina*. "I thought at that time," said Haydn in his old age, "that all was right if the paper was only full of notes; Reuter laughed at my unripe production, at passages which no voice nor instrument could have executed, and scolded me for undertaking 16 parts before I had command of two." With little bread, little instruction, and many a beating from Reuter, Joseph reached his 16th year, when his voice began to break, and his master, seeing that he could no longer make him a source of profit, sought a fit occasion to dismiss him. Joseph was often in difficulty from his practical jests. One of these gave Reuter the wished-for occasion. One of the boys wore his hair long and tied in a queue. Joseph, to bring him into uniformity with the others, took opportunity to cut it off, and being complained of was sentenced to a severe castigation upon the open hand. He begged hard to be let off, offering to resign if his punishment were remitted. "No help for you," said Reuter; "you shall first receive your *Schilling* and then march." He kept his word. The boy of 16 was turned into the streets of Vienna with a threadbare coat and 8 bad shirts. His parents could not aid him, and besought him, especially the mother, to carry out the old plan and enter the church. What he had seen of the lower clergy during his 8 years in St. Stephen's had not increased his liking for such a life, and he returned to Vienna to see what could be done in music. He took up his abode in a garret room of a 5 story house, where he had neither stove nor fireplace, and where rain and snow penetrated through the holes in the roof. How he for the first few months contrived to keep soul and body together is not known. His old worm-eaten harpsichord and his violin were often his only meat and drink, and he forgot in practising them the hunger which he could not appease. Among the first friends whom the boy found was a widow, who with

her daughter lived by knitting. Once when Joseph was making merry over his lodgings, telling of his visitors the rain and snow, the widow saw the earnest side of the joke, and gave him permission to sleep on the floor in her own room when the winter came—a permission thankfully accepted. She afterward fell into extreme want. Haydn was then in prosperity; in his good fortune he remembered her, and for 80 years gave her a small monthly pension. It was at this period that his genius received its permanent direction. The first 6 sonatas of O. P. E. Bach—perfecter of the modern sonata form—fell into his hands. "I could not leave my instrument," said he in his old age, "until I had played them through; and whoever thoroughly understands me, must see that I owe very much to Emanuel Bach; that I comprehended, and industriously studied him. Emanuel Bach himself sent me a compliment for this." After a time he attracted the notice of Metastasio, who lived in the same house. The poet had charge of the education of a Signora Martinez, then a child, and Haydn was employed to give her rudimental instructions in music, thus having opportunity to make himself a thorough master of the Italian language, and what was better, of obtaining a sufficient supply of food. Through Metastasio he became acquainted with Porpora, who was again in Germany and giving singing lessons to the mistress of Correr, the Venetian ambassador. Thus far Haydn had had no opportunity of studying the theory of music with a master, nor had been able to purchase books for this purpose. It was therefore of the greatest importance to him to have the benefit of the profound knowledge and experience of Porpora. Porpora, too, wished for some one to play the accompaniments when he gave his lessons. There could be no objection to the small, dark-visaged, pock-pitted, threadbare-coated, but always neat and clean boy of 18 recommended by Metastasio, and Haydn was engaged. That he received lessons from Porpora directly, save such as were necessary to render him adequate to the old master's demands upon him, is very doubtful, but he derived the highest advantage from being present at the lessons, and willingly bore the old man's ill humor, sometimes vented upon his ribs, at others in the savory epithets *asino*, *bestia*, and the like. During a visit of 8 months in summer to the baths of Mannersdorf, Correr took his mistress and her teacher, and Haydn chose to act during that time as Porpora's servant rather than miss the opportunity of improving himself. He wore no livery, and dined at the table of Correr's officials, not at that of the servants. He was known as Porpora's accompanist, and in this capacity attracted the notice of the great Gluck, of Wagenseil, and other musical notabilities of Vienna of that period. His salary at this time was 6 ducats a month—a very creditable one for a youth not yet 19 years of age all things considered, he was well paid for putting up with the humors of Porpora. From this time onward his prospects were continually

brighter. A Baron Fûrnberg often invited him to his house both in the city and in the country, to small musical parties; and for him, during the autumn of 1750 or the winter following, Haydn composed his first quartet for stringed instruments. Returning one day to his lodgings—which were now in another street and comfortable—he found that his clothes and a few other possessions had all been stolen. But he had already made friends, and now one of them gave him a good suit of black, another linen, &c., and Fûrnberg took him for two months to his country seat. From 1751 to 1759 his life was that of a successful young music teacher. His fees for instruction gradually rose from 2 to 5 florins per month. Sundays and church festivals were busy days with him; at 8 in the morning he played the organ in the chapel of the Carmelites, at 10 in the chapel of Count Hanguitz, and at 11 he sang (tenor) in his old choir at St. Stephen's, receiving for each service 17 kreutzers. He was often employed in serenading, his own music generally forming part of the programme. In his age he remembered having written a quintet for one of these occasions. One evening the handsome wife of Kurz, a famous harlequin, was the recipient of the serenaders' homage, and the husband was so struck by the music as to go down to the street and ask who was its author. Young Haydn, then about 20, acknowledged it. Kurz had the text for a short comic opera, *Der hinkende Teufel* ("The Limping Devil"), a satire on the lame theatre director, Affligio, and this he persuaded Haydn to compose. The piece was given 8 times with applause, and then forbidden by the police. Haydn received for his work 24 ducats—a larger sum than had ever before been in his possession. Having now the means, Haydn determined to make himself master of the science of music, and to reduce to order what he had previously acquired by observation, practice, and the hints of Porpora and others. His first purchase was the theoretical work of Emanuel Bach, which appeared in 1753. Then came Mattheson's *Vollkommener Kapellmeister*, and finally Fux's *Gradus ad Parnassum*. To these works he devoted a most thorough study, giving the preference on the whole to Bach, although he afterward used Fux as his text book in teaching on account of the excellence of his method. His own pen was never idle. Beside his exercises in harmony and counterpoint for his own improvement, he wrote pieces in infinite variety for his pupils, which fell into the hands of publishers and made him known, though they gave him no pecuniary profit. In 1759, at the age of 27, Haydn at length obtained an appointment. A Bohemian, Count Morzin, engaged him as music director and composer, with a salary of 200 florins, free lodgings, and table with his secretaries and other officials. Haydn now resolved to marry. A hair dresser, Keller, in the Landstrasse, Vienna, had often aided him in his days of want, and in return Haydn had instructed the eldest



daughter in music, and to her lost his heart. But she had chosen to enter a convent, and, urged by gratitude and the persuasions of Keller, he transferred his proposal to her sister, and married her. She proved but a sorry match for the chapelmaster. She had few truly feminine qualities, and was disposed to squander Haydn's earnings. Morzin would have no married men in his orchestra, and Haydn was obliged to keep his marriage secret. It was during this year that Haydn wrote his first grand symphony for full orchestra. Before the winter of 1759-'60 was over, which Morzin spent in Vienna, he found it necessary to reduce his expenses, and one step was to dismiss his orchestra. This was no loss to Haydn, for Prince Nicholas Esterhazy had heard his symphony and seen him at the head of the orchestra, and in March, 1760, appointed him to the position of vice chapelmaster, under the direction of his chapelmaster Gregorius Werner, at a salary of 400 florins, free lodging, &c. Before this year had passed the prince died, and his brother Nicholas succeeded to the principality. The new prince immediately appointed Haydn chapelmaster, at first with the same salary, but afterward raised at various times, until it reached 1,000 florins per annum. This position Haydn held without interruption until Esterhazy's death, full 30 years. Though his salary according to the ideas of our time was small, it was not thought so then; and to Haydn, who spent 8 or 9 months of the year at Eisenstadt or Esterhazy, the demesnes of the prince in Hungary, and but a few months in the winter season in Vienna, it was ample. The prince was ever ready with his purse, and thrice when Haydn's house in Eisenstadt was burned, Esterhazy rebuilt it at his own expense. In his will he gave Haydn a pension equal to his salary for life, and his successor, though he dismissed his orchestra, continued to Haydn his title of chapelmaster, and added 400 florins to his pension. The composer had free range of the fields and forests of the prince, and could gratify his passion for shooting and fishing to his heart's desire. It cost him little to live in the country, with no family but a wife and servant or two; and but for Frau Haydn's propensity to squander her husband's earnings, he might have saved a handsome share of his emoluments. Of his wife Haydn seldom spoke; but on one occasion near the close of her life, when Griesinger desired to make some return to Haydn for a favor for which he himself would accept nothing, and proposed to make his wife a present, Haydn replied: "She deserves nothing; and it is nothing to her whether her husband be a cobbler or an artist." A few lines from a French traveller who visited Esterhazy about 1782 are worth a place here: "The chateau stands quite solitary, and the prince sees nobody but his officials and servants, and strangers who are drawn hither from curiosity. He has a puppet theatre, which is certainly unique in character. Here the grandest operas are produced. One knows not whether to be

amazed or to laugh at seeing *Alceste*, *Alcides*, *Al bivio*, &c., put upon the stage with all due grandeur and played by puppets. His orchestra is one of the best I ever heard, and the great Haydn is his court and theatre composer. He employs a poet for his singular theatre, whose humor and skill in suiting the grandest subjects to his stage, and in parodying the gravest pieces, are often exceedingly happy. He often engages a troop of wandering players for months at a time, and he himself with a few officials and servants forms the entire audience. They are allowed to come upon the stage uncombed, drunk, their parts not half learned, and half dressed. The prince is not for the serious and the tragic, and he enjoys it when the players, like Sancho Panza, give loose reins to their humor." For this man, a passionate lover of music and a virtuoso on the baryton—an instrument in size between the viola and violoncello, with 7 strings of catgut over the bridge, and 16 of metal under it—the witty, jocular Haydn, ever ready with new and excellent music in which no tragic tones resounded, was just the man. Haydn said of him toward the close of his life: "My prince was satisfied with all my works; I received applause; as chief of the orchestra, I could try experiments, observe what produced the right effect and what weakened it; could therefore improve, add, cut out, venture. I was separated from the world, nobody to meddle with and plague me, and so I was perforce original." The demand upon him for church and instrumental music was constant; for theatrical music frequent; and the best of the year's productions in the country came in the winter to a hearing in Vienna before the highest musical circle in Europe. Thus 10 years had not passed since entering the service of Esterhazy before the name of Haydn had a European reputation, and the publishers of Leipsic, Berlin, Hamburg, and even of more distant cities, vied with those of Vienna in giving his works to the world. Anything like a complete catalogue of his compositions during these 30 years is impossible; much was lost when his houses were burned, much was scattered; but we know of 163 pieces for the baryton, from the solo with pianoforte to the octet and grand concerto; of symphonies for full orchestra, at least 4 per annum; of a score or two of masses and other works for divine service in the prince's chapel; of more than 100 works of chamber music of the higher forms, with an immense number of simpler construction. At least 12 Italian operas by him were performed in the private theatre, and 4 German operettas by the marionettes. The oratorio *Il ritorno di Tobia* was composed in 1774 for the "Musicians' Widows and Orphans Society" in Vienna, he being a candidate for admission. On learning that he must bind himself to compose for the society whenever called upon, he withdrew his score; and the society 18 years later was proud to elect him an honorary member. The fame of his Italian



operas procured him an order to compose one for the imperial opera house in Vienna. *La vera costanza* was written and accepted. Haydn had studied the capacities of the singers carefully, and adapted his parts with great skill to their various powers. The theatre was in the hands of the same Italians who had before succeeded in preventing the performance of the boy Mozart's *La finta semplice*, and it was enough to array them against Haydn, that he was a German. The one means in their power to kill the opera was to make an entire change in the distribution of the parts, and this they did. Saying, "I know what and for whom I wrote," Haydn took his score and returned to Eisenstadt. During the building of the new chateau at Esterhazy, the accommodations were so limited that the prince took with him of his orchestra but a few virtuosos, who were obliged to leave their families at Eisenstadt. Six months passed, and the young men, full of impatience to return, were astonished and despairing to learn that Esterhazy intended to prolong his stay two months. The young men came to Haydn praying him to find some means of changing the prince's determination. To have sent in a petition would only have brought upon him and them the laughter of their employer. Haydn composed a sextet, giving the first violin to the virtuoso Tomasini, whose playing would be sure to hold the prince until the close. At the performance one player after another ceased, blew out his candle, took his music and instrument, and silently left the room, until at length Tomasini alone remained, and he only to finish his part, when like the rest he put out his light and withdrew. "If they all go away, we must leave too," said Esterhazy. The performers had waited in an anteroom, and as the prince came through he said laughing: "Haydn, I understand it; the gentlemen can all leave tomorrow." This is Haydn's own account of the circumstance, which has been related with many changes and additions. The sextet was afterward developed into a symphony. In 1780 the philharmonic society of Modena sent Haydn a diploma as honorary member. In 1785 he received an order from Cadiz in Spain to compose a series of 7 adagios for orchestra, to be played in the principal church at the annual festival in commemoration of the crucifixion. To these 7 adagios were afterward adapted words founded upon the 7 phrases spoken by Christ upon the cross. As adagios, performed in a church lighted by a single lamp, the priests prostrate before the altar, and the multitude kneeling in silence, this music is, as Haydn himself declared, among the most successful of his compositions; although, as an oratorio sung in a concert room, it may fail of making any very favorable impression. Prince Nicholas Esterhazy died Sept. 28, 1790. His son and successor Anthony, not having the taste of his father, dismissed the orchestra, retaining Haydn nominally as his chapelmaster. The composer was now free from all labor but that of composition, had a

handsome income secured to him, and, having made Vienna his permanent residence, occupied himself in laying plans for future works on a grander scale than any hitherto attempted. There only could he compete with the young Mozart, whom he loved as a son, but whose genius was a spur to the veteran. A few weeks after the death of Esterhazy a stranger entered the room of Haydn. "I am Salomon, of London," said he, "and come to take you thither; to-morrow we will strike a bargain." Salomon was a native of Bonn, but left that city early in life to enter the service of Prince Henry of Prussia, and in 1783 emigrated to London. He had repeatedly urged Haydn by letter in previous years to visit that city, and Prince Esterhazy was ready to give the necessary leave of absence; but Haydn was unable to make up his mind to accept the invitation. Gallini, the undertaker of the great professional concerts in Hanover square, with Salomon was upon the continent at this time engaging singers and virtuosos for the succeeding season. Salomon was already at Bonn on his way back to London, when he learned the death of Esterhazy, and immediately started for Vienna to engage Haydn. The composer hesitated long, but an offer of 3,000 florins for an Italian opera, and 100 florins for every new work which he should compose and direct in a series of 20 concerts—the 5,000 florins to be deposited in a banking house upon his arrival in London—at length overcame his scruples, and on Dec. 15, 1790, he left Vienna. The arrival of the great composer in London then made such a sensation as that of a great songstress does now. The musical world received him with the highest degree of enthusiasm, which increased with each new work that he produced. Soon after the concerts began, a quarrel broke out between Gallini and Salomon on the one part, and the other directors of the concerts on the other, which resulted in driving the two from Hanover square to the Haymarket theatre. Haydn, having made his contract with Gallini, remained faithful to him notwithstanding the offer of a large sum from the other party. The public followed Haydn to the Haymarket, and the enterprise of Gallini and Salomon was successful. Haydn's first stay in London lasted 18 months. The principal works produced were: *Orfeo* (opera seria), 2 symphonies, a symphony concertante, "The Storm," a grand chorus with orchestra, 6 quartets, 11 sonatas, several beautiful songs and canzonets, and the arrangements to more than 100 Scotch songs. The *Orfeo* was not given because Gallini's license did not include operatic performances. In the summer of 1792 Haydn returned to Vienna, with a handsome sum saved from his earnings, and the fame of being (Mozart had died during his absence) the greatest of living composers. On Jan. 19, 1794, he left Vienna for a second visit to London, where he was received with no abatement of admiration and respect, and where he again remained a year and a half. His principal works were 8

symphonies, a large number of songs and airs, both with pianoforte and orchestral accompaniment, the Ten Commandments composed as canons, 24 minuets and German dances, 6 contre dances, 3 sonatas, an overture, ballads, &c. George III. and his queen endeavored to persuade him to remain in England; the university of Oxford created him doctor of music. All classes vied in testifying their admiration of his genius. His fame preceded him to Vienna, and soon after his return in 1795 he gave a concert, which was crowded to excess, wherein he produced his 3 new symphonies, and in which the young Beethoven appeared both as composer and virtuoso, and played his own first pianoforte concerto. Haydn was now in Vienna what he had been in London, the unrivalled master. His name as director of any of the great concerts for charitable purposes was enough to fill the house; his works cast all others into the shade. He had brought with him from London an English text for an oratorio, prepared by Linley, from Milton's "Paradise Lost," entitled the "Creation." Not venturing to compose so grand a work to an English text, he placed it in the hands of Baron van Swieten, son of the famous physician, who translated and arranged it in its present form. Twelve persons of the highest nobility subscribed to the amount of 600 ducats, which they offered him for a composition of the new text. Haydn accepted the proposition, and in the 65th year of his age he completed this magnificent work. It was first produced March 19, 1799. Its great success led Van Swieten to prepare another text from Thomson's "Seasons," which was composed within the next two years, and first produced at Vienna under the title of *Die Jahreszeiten* (the seasons), April 24, 1801. This labor had been too great for him—at all events, he had devoted himself to it too exclusively; and the barren, unpoetical text had been a source of great trouble and annoyance. Soon after finishing it he felt a feverish attack in his head, and from that time his strength, both mental and physical, sensibly failed. From this period to his death he spent most of his time in his house and garden, which had become one of the principal attractions to strangers in Vienna. On March 27, 1808, the now feeble old man was once more induced to appear in public. It was at a performance of the "Creation," in the great hall of the university. Haydn was received at the door by the rector of the university, Salieri, Beethoven, and other composers, by a director of the concert, and others of the nobility, and borne to a seat of honor by the side of the princess Esterhazy. At the famous passage, "and there was light!" in the first chorus, the audience as usual burst into tumultuous applause. Haydn, waving his hand toward heaven, exclaimed: "It comes from there!" At the end of the first part he felt it necessary from his great weakness to leave the room; and as he was borne out in the great chair in which he had sat, he once more, with tearful eyes, turned

to the orchestra, and spread out his hands as if to bless them. It was his farewell act to the whole world. On May 10, 1809, early in the morning, a corps of the French army advanced toward the suburb Mariahilf of Vienna, not far from Haydn's house. His servants were engaged in getting him out of bed and dressing him when 4 cannon reports shook the house, and frightened the domestics. "Children," said Haydn, "fear not; where Haydn is, no misfortune can befall you." But he had hardly spoken these brave words when he himself began to tremble violently. He now declined rapidly, and died May 31, in his 78th year.—Gerber's attempt to catalogue Haydn's works fills over 13 octavo pages of his *Neues Lexikon*, and is far from being complete. Haydn himself in 1805 was unable to give a complete list of his compositions; he could remember but 118 symphonies, yet Gerber had at that time the themes of 140. His compositions in England alone filled 768 leaves (1,586 pages) music folio. The following is an abstract of the list which he made out in 1805 for Prof. Bertuch, "of such as he could remember:" 118 symphonies, 83 quartets, 24 trios, 19 operas, 5 oratorios, 163 compositions for the baryton, 24 concertos for different instruments, 15 masses, 10 pieces of church music, 44 sonatas for pianoforte, with and without accompaniment, 42 German and Italian songs, 39 canons, 13 vocal pieces for 3 and 4 voices, 365 Scotch and English songs arranged with accompaniments, 40 *divertimenti* for from 3 to 9 instruments, 4 fantasias, capriccios, &c. Haydn will for ever fill a large space in musical history, not only for the magnitude, number, originality, and beauty of his compositions, but as being one of the small number who have made eras in the development of the art. He is the great mentor in the department of orchestral and chamber music—the father of the modern quartet and its kindred forms, and of the grand symphony. By this it is not meant that orchestras and small companies of performers on stringed instruments were unknown before his time, but that he, adopting the sonata form as perfected by Emanuel Bach and introducing it into compositions for the orchestra and chamber, laid the foundation for that wonderful development of instrumental music, exhibited in his own later compositions and in the works of Mozart, and which reached its climax in the musical "poems" of Beethoven. There are but two names in musical history for which this honor is claimed at the expense of Haydn's fame. The one, San Martini (Sammartini), belonged to the old Italian school, and if any of his instrumental works belong to the new era they are those of his later days, when Haydn's influence was already everywhere felt. But the fame of Haydn has hardly been seriously claimed for San Martini. Of the other, Boccherini, for whom more serious claims have been urged, it is sufficient to say that when Haydn's quartets were already becoming known and gaining him a reputation, Boccherini was a

child of 13 or 14 years; that Haydn was already in the service of Prince Esterházy as chapelmaster, when Boccherini's opus I., *Sei sinfonie*, for two violins, alto and 'cello obbligato—that is, mere quartets—was written; that Boccherini's first work for more than 4 instruments—a concerto (op. 8) for 6 instruments obbligati, and 6 *ad lib.*—was not composed until 1769, before which date at least 18 of Haydn's symphonies and several of his quartets had been printed in Paris. Haydn thought it unfortunate that circumstances had led him so preponderantly into the field of instrumental composition, rather than into that of operatic writing. But in this no one, who is acquainted with his works at all extensively, can doubt he was in an error. He was of too happy a temperament to have touched the deep-toned harps of Handel, Gluck, Mozart, and Beethoven. For more than half a century music flowed from his pen in a continuous stream, always new, always attractive, always cheerful, always beautiful, often grand, sometimes reaching the sublime, but never betraying any touches of really tragic sorrow or grief. He was the musical apostle of the beautiful and the happy.—MICHAEL, a German composer, brother of the preceding, born in Rohrau, Sept. 16, 1787, died in Salzburg, Aug. 18, 1808. He was educated in music by Reuter, and rose to eminence as an organist and composer, chiefly in consequence of his close study of the works of Fux, Bach, Handel, and Graun. He was chapelmaster at Groeswardeln, in Hungary, and occupied the same position in the cathedral in Salzburg, where he also established an excellent school of counterpoint. His works are numerous, and embrace operas, oratorios, masses, symphonies, and many other popular forms of vocal and instrumental composition; but they are little known in consequence of the reluctance of the author to have them published during his life. His brother Joseph considered him the best composer of sacred music of the day.

HAYDON, BENJAMIN ROBERT, an English historical painter, born in Plymouth, Jan. 25, 1788, died by his own hand in London, June 22, 1846. Disregarding the wishes of his father that he should adopt his own business, that of a bookseller, he went to London at the age of 18, and became a student in the school of the royal academy, where Wilkie and Jackson were his fellow pupils. He was an enthusiast in the pursuit of what is called "high art," and prosecuted his studies in drawing and anatomy with singular earnestness. His first picture, "Joseph and Mary resting with our Saviour after a Day's Journey on the Road to Egypt," an ambitious subject for a young man, was exhibited in 1807, and immediately purchased by Thomas Hope, the author of "Anastasia." This was followed by "Dentatus," a work which established his reputation, but involved him in a quarrel with the academy, whose hanging committee had placed the picture in a small side room. A fondness for controversy

led him to publish several attacks upon the academy, which had only the effect of estranging some of his most valuable friends, of exasperating his own temper, and of cutting him off from what was the chief ambition of his life—the honor of being an academicien. From this time forward, notwithstanding the frequent production of eminent works, he had constantly to struggle with pecuniary difficulties. In 1815 he established a school, in opposition to that of the academy, in which, among others, the Landseers and Eastlake were instructed, and about the same time became associated in the conduct of a periodical entitled "Annals of the Fine Arts." Having no tact for either pursuit, he failed in each, and in 1823, two years after his marriage, was so involved in debt that he became an inmate of the king's bench prison, where he remained 3 months. Subsequently he painted here one of his most characteristic works, "The Mock Election," representing a scene which took place within the prison walls in July, 1827, and which was purchased by George IV. for 500 guineas. For his "Pharaoh and Moses," painted soon after his release, he obtained an equal sum. Notwithstanding these and similar emoluments, in 1836 he again became a prisoner for debt, but was soon after enabled to compound with his creditors. About this time he lectured on painting with considerable success, though with no permanent pecuniary benefit. Upon the publication by government of proposals for decorating the new houses of parliament with frescoes representing scenes in the history of the nation, Haydon, who had done more perhaps than any other man to secure this end, sent to the exhibition in Westminster hall two cartoons, "The Curse" and "Edward the Black Prince," not doubting that he would be one of the artists employed. No notice was taken of his performances, and his hope of executing some great public work of art was crushed for ever. To show the world how erroneous had been the decision of the judges, he commenced a series of gigantic pictures, including "Uriel and Satan," "Curtius Leaping into the Gulf," the "Burning of Rome," and the "Banishment of Aristides," the two latter of which, while on exhibition in London, attracted but 133 visitors during the time that Tom Thumb in an adjoining room received 120,000. Under the weight of this neglect and of pecuniary embarrassments his reason gave way, and while engaged on his last great picture, "Alfred and the Trial by Jury," he put an end to his life, having first written in his journal: "Stretch me no longer on this rough world." A post-mortem examination discovered a long-seated disease of the brain, which may account for much of his eccentricity. His family were provided for by a public subscription. Haydon's autobiography, edited by Tom Taylor in 1853 (2d ed. 3 vols. 8vo.), lays bare the character of the man, and explains his unhappy career. His love of art was a passion rather than a principle. An impetuosity of temper, impe-



tience of criticism, and an exaggerated estimate of his own powers and of his mission as the apostle of high art, were continually involving him in disputes. No man ever alienated more friends, and no man needed more the offices of friendship. At the same time he was a kind father and husband, and his journal, which comes down to the moment of his death, abounds in short occasional prayers of affecting earnestness. His works are characteristic. Often exaggerated in form and in feeling, they possess undoubted marks of genius, and are better appreciated now than during the life of the artist. His "Judgment of Solomon," "Christ's Entry into Jerusalem," "Christ Rejected," "Christ's Agony in the Garden," and "Raising of Lazarus," all painted previous to his first imprisonment for debt, and in the maturity of his artistic powers, are among the most favorable specimens of his style. Several of these pictures contain portraits of eminent personages, and the "Christ's Entry into Jerusalem" is now the property of the Catholic cathedral in Cincinnati. His literary efforts are confined chiefly to his "Lectures on Painting and Design" (2 vols. 8vo., 1844-'6), which are bold and clear expositions of the principles of art as he understood them. He also wrote the article on painting in the "Encyclopædia Britannica," and by his personal exertions induced the government to purchase the Elgin marbles.

HAYES, AUGUSTUS ALLEN, an American chemist, born in Windsor, Vt., Feb. 28, 1806. He was graduated at the military academy, Norwich, Vt., in 1823. On leaving this institution he began the study of chemistry as a profession, under Dr. James F. Dana, then professor of chemistry at the New Hampshire medical college. In 1825 a laborious research undertaken by him, for the purpose of more accurately determining the proximate composition of various American medicinal plants, was rewarded, among other results, by the discovery of the organic alkaloid sanguinaria, a compound remarkable for the brilliant colors of its salts, although itself colorless, or nearly so. In 1827, while filling the post of assistant professor of chemistry in the New Hampshire medical college, he investigated the compounds of chromium; and his paper on this subject, republished in Europe in 1828, was highly praised by Berzelius. Dartmouth college about the same time conferred upon him an honorary degree of M.D. Since 1828 Dr. Hayes has resided in Boston or its vicinity, and has devoted his time to chemical investigations as varied as they have been important; sustaining also successively the posts of director of an extensive manufactory of colors and chemical products at Roxbury, Mass., and of consulting chemist or director of some of the most important dyeing, bleaching, gas, iron, and copper smelting establishments in New England. His published contributions to science during the same period have been numerous and valuable, and may be found chiefly in the "Proceedings" of the

American academy and of the Boston society of natural history, in the "American Journal of Science," and in the "Annual of Scientific Discovery." In 1837 he conducted an elaborate investigation upon the economical generation of steam and the relative value of fuels, which in 1838 led to a novel arrangement of steam boilers, now in general use; some of the results of this investigation are also embodied in the report of the late Walter R. Johnson to the U. S. government on the comparative value of various mineral coals. To Dr. Hayes belongs also the credit of the important application of the oxides of iron in refining pig iron in the puddling furnace, so as to produce without loss a pure malleable iron; and still earlier, the refining of copper was, under his direction, rendered a much shorter and more certain operation, by the introduction of the scales of oxide of copper produced in refining. Among other important original researches instituted and published by Dr. Hayes, may be mentioned those in relation to the chemical decomposition of alcohol by chlorine and the formation of chloroform; upon the action of alcohol upon the human system, and the demonstration of its invariable oxidation in the system into aldehyde, acetous and acetic acids; on the formation, composition, and specific differences of the varieties of guano; on the existence of a deposit of native iron on the west coast of Africa; and a memoir on the difference in the chemical constitution and action of sea waters, on and below the surface, on soundings, and at the entrances of rivers. This last research forms part of an investigation undertaken under a commission from the U. S. navy department to examine and report on the subject of copper and copper sheathing as applied in the construction of national vessels. The details of this investigation, which have not hitherto been published in full, and which have extended through a period of years, embody a vast amount of scientific and commercial information. Dr. Hayes holds the office of state assayer of Massachusetts.

HAYLEY, WILLIAM, an English author, born in Chichester in 1745, died in Felpham, Nov. 20, 1820. He was educated at Eton and Cambridge, and studied law, but being rich devoted himself to literature. In 1792 he made the acquaintance of Cowper, whose life he afterward wrote (1802). His "Triumphs of Temper," a poem in 6 cantos (1781), was perhaps the most popular of his poetical works. Among his other writings are an "Essay on Painting" (1778); "Essay on History" (1781); "Essay on Old Maids" (1785); and the "Life and Poetical Works of Milton" (1794).

HAYNAU, JULIUS JAKOB VON, an Austrian general, born in Cassel, Oct. 14, 1786, died in Vienna, March 14, 1853. He was an illegitimate son of the elector William I. of Hesse-Cassel. The latter, while stationed with his regiment in the town of Haynau in Prussian Silesia, formed an illicit connection with an apothecary's daughter named Rebekka Ritter, who after a morgan-

atic marriage with him assumed the name of Fran von Lindenheim. Two daughters and 4 sons resulted from this marriage, who adopted the name of their mother's birthplace. The eldest son, Wilhelm (1779-1856), became known by the unpopular part which he took in the affairs of Hesse-Cassel in 1850; the 2d son, Friedrich, was minister of war of the elector from 1858 to 1855; the 3d son, Ludwig, died in Heidelberg in 1843; and the 4th son, the subject of this notice, entered the Austrian service in 1801 as lieutenant, was wounded and captured in the campaign of 1805 near Nördlingen, was in 1813 and 1814 with the army in Italy, and in 1815 on the upper Rhine. He became military commander of Gratz in 1844, and of Temesvár in 1847. Radetzky, who entertained a high regard for his military abilities, appointed him commander of Verona in 1848. In the night of July 24-25 he despatched, upon his own responsibility, a number of soldiers to Somma Campagna, and secured by this measure the victory of Custoza. Afterward he displayed his skill at the siege of Peschiera. He became notorious for his rigorous measures at Ferrara, Bergamo, and in other places; and his ruthless energy in quelling the insurrection of Brescia (March and April, 1849) spread terror among the Italian population. He subsequently took part in the siege of Venice, but on May 30 he was invited to assume the supreme command of the Austrian army in Hungary. He defeated the Hungarians near Raab and in other localities, and, protected in the flank and rear by the Russian forces, he rapidly advanced toward Szegedin, crossed the Theiss, routed the

Hungarians near Szörge (Aug. 5) and near Temesvár (Aug. 9), by which victory he rescued that fortress, and virtually terminated the war. The emperor of Austria rewarded him with the governorship of Hungary, and gave him extensive estates. The execution of the 13 Hungarian generals at Arad, as well as of Batthyányi and numerous other patriots at Pesth, took place under his command. His intractable and haughty temper, which on many occasions had brought him into collision with his superiors, at length caused him to be dismissed from the public service, July 6, 1850. He travelled in England, where, for his cruelty toward the Italians and Hungarians, and especially the ill treatment to which female political prisoners were said to have been subjected under his orders, he was assailed by the draymen of Barclay's brewery in London, on his visit to that establishment in Sept. 1850, in such a violent manner that he barely escaped with his life. Other hostile demonstrations were made against him in Brussels and Hanover, and his sinister appearance, together with the many stories set afloat about his cruel disposition, caused him to be called the Austrian hyena. His name has certainly been more identified with Austrian oppression in Hungary and Italy than that of any other servant of the house of Hapsburg; but Baron Schönhals in his biography of his comrade, which appeared in Gratz in 1853, tries to exonerate him from the charge of intentional or constitutional cruelty, and asserts that he acted only in obedience to the orders of his masters. He left a large estate, but no male issue. His only daughter Klotilde is unmarried.

# CONTENTS OF VOLUME VIII.

PAGE		PAGE		PAGE		
Fugger, Family of.....	1	Futtesghur.....	33	Gallatt, Louis.....	54	
Fugger, Andreas.....	1	Futtespoor.....	33	Galland, Antoine.....	54	
Fugger, Ulrich.....	1	Futtipoor Sikra.....	33	Gallas.....	54	
Fugger, Georg.....	1	Fyzabad.....	33	Gallatin co., Ky.....	55	
Fugger, Jakob.....	1			Gallatin co., Ill.....	55	
Fugger, Raimund.....	1			Gallatin, Albert.....	55	
Fugger, Anton.....	1			Gallsudet, Thomas Hopkins, LL. D.....	58	
Fugitive.....	1			Galle, I. G.....	58	
Fugue.....	2			Galleon.....	58	
Fulda.....	2			Galley.....	58	
Fulgurite.....	2			Gallia co.....	58	
Fuller, Andrew.....	2			Gallio Acid.....	59	
Fuller, Margaret, see Ossoli, Mar-				Gallican Church.....	59	
garet Fuller.....	2			Gallienus, Publius Licinius Egna-		
Fuller, Richard.....	2			tna.....	60	
Fuller, Thomas.....	2			Gallinule.....	60	
Fuller's Earth.....	4			Gallio, Junius.....	61	
Fullerton, Lady Georgiana Char-				Gallipoli, Turkey.....	61	
lotte.....	4			Gallipoli, Naples.....	61	
Fulling.....	4			Gallitzin, Family of.....	61	
Fulminates.....	5			Gallitzin, Mikhail.....	61	
Fulminic acid.....	5			Gallitzin, Vasilii.....	62	
Fulton co., N. Y.....	6			Gallitzin, Vasilii, the Great.....	62	
Fulton co., Penn.....	6			Gallitzin, Alexander.....	62	
Fulton co., Ark.....	6			Gallitzin, Dmitri (two).....	62	
Fulton co., Ky.....	6			Gallitzin, Amalia.....	62	
Fulton co., Ohio.....	7			Gallitzin, Berghel.....	62	
Fulton co., Ind.....	7			Gallitzin, Emanuel.....	62	
Fulton co., Ill.....	7			Gallitzin, Demetrius Augustine.....	62	
Fulton, Ohio.....	7			Gallitzin, Elizabeth.....	62	
Fulton, Mo.....	7			Gallon.....	62	
Fulton, Robert.....	7			Galloway, Joseph.....	62	
Fulvia.....	10			Galle.....	64	
Fumigation.....	10			Gallup, Joseph Adam.....	64	
Funchal.....	10			Galk, John.....	64	
Function.....	10			Galvani, Aloisio.....	65	
Fundy, Bay of.....	11			Galvanism, see Animal Electricity,		
Fünen.....	11			and Electro Dynamics.....	65	
Funeral Rites, see Burial.....				Galvanized Iron.....	65	
Funes, Gregorio.....	11			Galveston co.....	65	
Fünfkirchen.....	11			Galveston.....	65	
Fung.....	11			Galway.....	66	
Fungible.....	16			Gama, Vasco da.....	67	
Funnel.....	16			Gamael.....	68	
Fur.....	16			Gambia.....	68	
Fur-Dressing.....	23			Gambia, a river.....	68	
Foreedpoor.....	24			Gambier.....	68	
Furetiere, Antoine.....	24			Gambier, James.....	68	
Furica, see Eumenides.....				Gamboge.....	69	
Furlong.....	24			Game Laws.....	69	
Furnace.....	24			Gaming.....	70	
Furness, William Henry, D. D.....	26			Gaming Houses.....	70	
Furniture.....	26			Gammell, William.....	70	
Furrukabad.....	30			Ganut.....	70	
Fürst, Julius.....	31			Gando.....	71	
Fürth.....	31			Ganges.....	71	
Fuse, Safety.....	31			Angilon.....	72	
Fusel Oil.....	31			Gangrene.....	72	
Fusell, Henry.....	31			Gangue.....	72	
Fusibility.....	32			Ganjam.....	72	
Fusible Metals, see Alloy, and Bis-				Gannal, Jean Nicolas.....	72	
moth.....				Gannet.....	74	
Fustian.....	32			Gannett, Ezra Stiles, D. D.....	74	
Fustio.....	32					

## G

	PAGE		PAGE		PAGE
Ganoide.....	74	Gaza.....	116	Georgetown, British Guiana.....	174
Ganz, Eduard.....	77	Gaza, Theodore.....	116	Georgia, U. S.....	174
Gansvoort, Peter.....	77	Gazel.....	117	Georgia, Asia.....	174
Ganymede.....	77	Gazelle.....	117	Georgia, Gulf of.....	174
Gar Fish.....	77	Gazetteer.....	117	Georgian Language and Literature.....	174
Garat, Dominique Joseph.....	79	Geauga co.....	117	Georgium Sidus.....	174
Garay, János.....	79	Geber, Abou Mounssah Djsar Al	117	Gepidae.....	174
García, Don Antonio Gutierrez.....	79	Soif.....	118	Gera.....	174
García, Manuel de Populo Vicente.....	79	Gecko.....	118	Geranium.....	174
García, Manuel.....	79	Geck, William.....	119	Gerando, Joseph Marie de.....	174
García, Pauline Viardot.....	79	Geddes, Alexander.....	119	Gerando, Auguste de.....	174
Garcilasso de la Vega (two).....	80	Geck, Guillaume.....	120	Gérard, Cécile Jules Basile.....	174
Gard.....	81	Geelong.....	120	Gérard, Etienne Maurice.....	174
Gard, Pont du.....	81	Geer, Karl de.....	120	Gérard, François Pascal Simon.....	174
Garda, Lake.....	81	Geerts, Charles Henri.....	120	Gérard, Henri.....	174
Gardais.....	81	Gefle.....	120	Gérard de Nerval.....	174
Garden, see Horticulture.....		Gehenna.....	120	Geras.....	174
Garden, Alexander.....	81	Geibel, Emanuel.....	120	Gerhard, Eduard.....	174
Garden, Alexander.....	82	Geiger, Abraham.....	120	Gerhardt, Charles Frédéric.....	174
Gardiner.....	82	Geijer, Eric Gustaf.....	121	Gerhardt, Paul.....	174
Gardiner, James.....	82	Gefne.....	121	Géricault, Jean Louis Théodore	174
Gardiner, Stephen.....	82	Gela.....	122	André.....	174
Gardiner, Sylvester.....	82	Gelatine.....	122	Gerlach, Ernst Ludwig von.....	174
Gardiner, John.....	82	Gelatine, Isinglass.....	122	Gerlach, Etienne Constantin de.....	174
Gardiner, John S. J.....	82	Gelatine, Glac.....	124	German Catholics.....	174
Gardinal, Giuseppe.....	82	Gelderland.....	125	German Ocean, see North Sea.....	174
Gariand, Hugh A.....	84	Gell, Sir William.....	125	German Silver.....	174
Gardic.....	85	Gellert, Christian Fürchtegott.....	125	German Theology.....	174
Garnet.....	85	Gellius, Aulus.....	125	Germanicus Caesar.....	174
Garnett, James Mercer.....	85	Gelon.....	125	Germany.....	174
Garnier, Adolphe.....	85	Gem.....	125	Germany, Language and Liter-	174
Garnier, Charles Georges Thomas.....	85	Gema, Artificial.....	125	ture of.....	174
Garnier, Clément Joseph.....	85	Gemini.....	125	Gerona.....	174
Garnier, Germain.....	85	Gemstina, George.....	125	Gerry, Elbridge.....	174
Garnier-Pagès, Etienne Joseph	85	Gempak, Sougita.....	125	Gers.....	174
Louis.....	87	Gemsbok, see Antelope.....	125	Gerson.....	174
Garnier-Pagès, Louis Antoine.....	87	Genealogy.....	125	Gerson, Jean.....	174
Garonne.....	87	Genesee, a river.....	125	Gersticker, Friedrich.....	174
Garrard co.....	87	Genesee co., N. Y.....	125	Gerund.....	174
Garretson, Freeborn.....	87	Genesee co., Mich.....	125	Gervinus, George Gottfried.....	174
Garrick, David.....	87	Genesee College, see Lima.....	125	Goenius, Friedrich Heinrich Wil-	174
Garrison, William Lloyd.....	89	Genesee Falls.....	125	helm.....	174
Garrote.....	91	Genesis.....	125	Geener, Konrad von.....	174
Garter, Order of the.....	92	Genest, Edmond Charles.....	125	Geesmer, Salomon.....	174
Garth, Sir Samuel.....	92	Genet.....	125	Geta, P. Septimius, see Caracalla.....	174
Gärtner, Joseph.....	92	Genève, N. Y.....	125	Gete.....	174
Gas.....	95	Geneva, Switzerland.....	125	Gethsemane.....	174
Gas, Portable.....	101	Geneva, Lake of.....	124	Gettysburg.....	174
Gas as Fuel.....	101	Geneviève, Saint.....	125	Gaulinac, Arnold.....	174
Gascolgne, George.....	102	Geneviève, Saint, Duchess of Bra-	125	Geyer, Henry Sheffle.....	174
Gascolgne, Sir William.....	102	bant.....	125	Geyers.....	174
Gasconade co.....	102	Genghis Khan.....	125	Gförrer, August Friedrich.....	174
Gascony.....	104	Genli.....	125	Ghara.....	174
Gascoygne, William.....	104	Genitive.....	125	Ghaute.....	174
Gaskell, Elizabeth C.....	104	Genlia, Félicité Stéphanie Ducrest	125	Ghazipur.....	174
Gasparin, Agénor Etienne.....	104	de.....	125	Ghee.....	174
Gaspé.....	104	Gennesareth, Lake of.....	125	Gheel.....	174
Gassendi, Pierre.....	104	Genoa.....	125	Ghega, Carlo de.....	174
Gasteropoda.....	105	Genoude.....	125	Ghent.....	174
Gaston co.....	105	Gens d'Armes.....	125	Gherardi del Testa, Tommaso.....	174
Gaston, William.....	105	Geneseric.....	125	Gheriah.....	174
Gaston de Foix.....	107	Gentian.....	125	Ghibellines, see Gualphs and Ghi-	174
Gastric Juice, see Digestion.....		Gentiles.....	125	bellines.....	174
Gataker, Thomas.....	107	Gentileschi, Orazio.....	125	Ghiberti, Lorenzo.....	174
Gates co.....	107	Gentleman.....	125	Ghiba, Helena.....	174
Gates, Horatio.....	107	Gentoo.....	125	Ghifan.....	174
Gateshead.....	108	Gentry co.....	125	Ghirlandato.....	174
Gath.....	108	Gentz, Friedrich von.....	125	Ghizeh.....	174
Gauden, John.....	108	Genus.....	125	Ghuznee.....	174
Gaudentius.....	108	Geocentric.....	125	Giannone, Pietro.....	174
Gandichaud-Beaupré, Charles.....	108	Geode.....	125	Giant.....	174
Ganging.....	108	Geodesy.....	125	Giant's Causeway.....	174
Gaul.....	109	Geoffrey of Monmouth.....	125	Gisour.....	174
Gausa, Karl Friedrich.....	111	Geoffroy, Julien Louis.....	125	Gibbes, Robert Wilson.....	174
Gautama, see Buddhism and		Geoffroy Saint Hilaire, Etienne.....	125	Gibboa, Edward.....	174
Buddha.....		Geoffroy Saint Hilaire, Isidore.....	125	Gibba, George.....	174
Gautier, Théophile.....	111	Geognosy.....	125	Gibba, Josiah Willard.....	174
Gavarni.....	112	Geography.....	125	Gibbeon.....	174
Gavazzi, Alessandro.....	112	Geology.....	125	Gibbeon co., Tenn.....	174
Gavelkind.....	112	Geometry.....	125	Gibson co., Ind.....	174
Gavial.....	112	George I.....	125	Gibson, John.....	174
Gay, Claude.....	112	George II.....	125	Gibson, John Bannister, LL. D.....	174
Gay, Delphine, see Girardin.....		George III.....	125	Gibson, Thomas Münster.....	174
Gay, Ebenezer, D. D.....	112	George IV.....	125	Giddings, Joshua Reed.....	174
Gay, Martin.....	112	George, Prince of Denmark.....	125	Giddings, Salmon.....	174
Gay, Winckworth Allan.....	112	George of Trebizond.....	125	Gideon.....	174
Gay, John.....	112	George, Lake.....	125	Gieseler, Johann Karl Ludwig.....	174
Gay, Marie Françoise Sophie.....	114	George, Saint.....	125	Giesen.....	174
Gay-Lussac, Joseph Louis.....	114	Georgetown dist., S. C.....	125	Gifford, William.....	174
Gaya.....	115	Georgetown, D. C.....	125	Gift.....	174
Gayangoo, Pascual de.....	115	Georgetown, S. C.....	125	Gignoux, Françoisque Rapha-	174
Gayarré, Charles A. Arthur.....	115	Georgetown, Ky.....	125		



# CONTENTS.

iii

	PAGE		PAGE		PAGE
Gil y Zarate, Antonio.....	249	Gliddon, George Robins.....	256	Gombo.....	266
Gila.....	249	Glinke, Family of.....	256	Gomer.....	266
Gilbert, Sir Humphrey.....	249	Glinke, Gregory.....	256	Gomorra.....	266
Gilbert, William.....	250	Glinke, Berghel.....	259	Goncalves, Joaquim Alfonso.....	266
Gilbert Islands.....	250	Glinke, Fedor.....	259	Gondar.....	266
Gildas.....	250	Glinke, Mikhail.....	259	Gondola.....	266
Gilding.....	250	Globe, Artificial.....	259	Gong.....	261
Gilead.....	250	Glogau.....	261	Gongora, Luis de.....	261
Giles co., Va.....	252	Glogmen.....	261	Goniometer.....	261
Giles co., Tenn.....	252	Glognoine.....	261	Gonsalvo de Cordova.....	261
Giles, Henry.....	252	Gloucester co., N. J.....	261	Gonzaga, Thomas Antonio Costa de.....	262
Giles, William Branch.....	252	Gloucester co., Va.....	261	Gonzales co.....	262
Gillfillan, George.....	252	Gloucester co., N. B.....	261	Gonzalo de Berceo, Juan.....	262
Gill.....	252	Gloucester, Mass.....	262	Goochland co.....	262
Gill, John.....	252	Gloucester, Eng.....	262	Good, John Mason.....	262
Gillespie co.....	252	Gloucestershire.....	262	Good Friday.....	262
Gillespie, William Mitchell, L.L.D.....	252	Glove.....	262	Good Hope, Cape of, see Cape of	
Gillies, John, L.L.D.....	252	Glover, Richard.....	262	Good Hope.....	266
Gillflower.....	252	Glow-Worm.....	262	Good Will.....	266
Gillray, James.....	252	Glucina.....	262	Goodall, Edward.....	266
Gillman, John Taylor.....	252	Gluck, Christoph Willibald von.....	262	Goodhue co.....	266
Gillman, Samuel, D.D.....	252	Gluckstadt.....	262	Goodrich, Elizur, D.D.....	266
Gillman, Caroline.....	252	Glue, see Gelatine.....		Goodrich, Chauncey.....	266
Gilmanton.....	252	Glut.....	262	Goodrich, Elizur.....	266
Gilmer co., Va.....	252	Glutton.....	262	Goodrich, Chauncey Allen.....	266
Gilmer co., Ga.....	252	Glycerine.....	262	Goodrich, Samuel Griswold.....	266
Gilolo, see Molocosa.....		Glynn co.....	262	Goodrich, Frank Booth.....	267
Gilpin, Bernard.....	257	Glyptodon.....	262	Goodwin Sands.....	267
Gimbale.....	257	Gmelin, Johann Georg.....	262	Goodyear, Charles.....	267
Gin.....	257	Gmelin, Samuel Gottlieb.....	262	Goekin, Daniel.....	267
Ginger.....	257	Gmelin, Johann Friedrich.....	262	Goemty.....	267
Ginseng.....	257	Gnat.....	262	Georgson.....	267
Gioberetti, Vincenzo.....	259	Gnatsman, August.....	262	Geosander.....	267
Gioja, Florio.....	259	Gnais.....	262	Geose.....	267
Gioja, Melchiorre.....	259	Gnassen.....	262	Geose Fish.....	267
Gioriano, Luca.....	259	Gnieditch, Nicolai.....	262	Geoseberry.....	267
Giorgione, see Barlaam, Giorgio.....		Gnome, see Proverb.....		Gopher.....	267
Giotto.....	259	Gnomes.....	262	Gordian Knot, see Gordius.....	
Giovio, Paolo.....	259	Gnostics.....	262	Gordianus, Marcus Antonius (two).....	267
Giraffe, see Camelopard.....		Gnu.....	262	Gordius.....	267
Giraldus Cambrensis, see Barry, Gerald.....		Goa.....	262	Gordon co.....	267
Girard, Charles.....	262	Goa, Old.....	262	Gordon, George.....	267
Girard, Grégoire.....	262	Goa, New.....	262	Gordon, Sir John Watson.....	267
Girard, Stephen.....	262	Goalsars.....	262	Gordon, William, D.D.....	267
Girardin, Delphine Gay.....	262	Goascoran.....	262	Gore, Catharine Grace.....	267
Girardin, Emile de.....	262	Goat.....	262	Gore, Christopher.....	267
Girardin, Marc.....	262	Goatsucker.....	262	Gorse.....	267
Girardon, Francois.....	262	Göbel, Trugott Friedemann.....	262	Gorges, Sir Ferdinando.....	267
Girdle.....	262	Gobellus, Royal Manufactory of the.....	262	Görgey, Arthur.....	267
Girgenti.....	262	Gobert, Napoleon.....	262	Gorgias.....	267
Girodet-Trioson, Anne Louis.....	262	Gobl.....	262	Gorgons.....	267
Gironde.....	262	God save the King.....	262	Gorilla.....	267
Gironde.....	262	Godavery.....	262	Goritz.....	267
Gironde.....	262	Goderich, Viscount, see Ripon, Earl of.....		Gorkhas.....	267
Gisors.....	262	Godfathers and Godmothers.....	262	Gorlitz.....	267
Gittith.....	262	Godfrey, Thomas.....	262	Görres, Jakob Joseph von.....	267
Gulio Romano.....	262	Godiva, see Coventry.....		Gorresio, Gasparo.....	267
Giurgova.....	262	Godman, John D.....	262	Gortchakoff, Family of.....	267
Gizzard, see Comparative Anatomy.....		Godolphin, Sidney.....	262	Gortchakoff, Petr.....	267
Glacier.....	262	Godoy, Manuel de.....	262	Gortchakoff, Dmitri.....	267
Glacis.....	262	Godwin, George.....	262	Gortchakoff, Alexander.....	267
Gladators.....	262	Godwin, Parke.....	262	Gortchakoff, Andrei.....	267
Gladstone, William Ewart.....	262	Godwin, William.....	262	Gortchakoff, Petr.....	267
Gladwin co.....	262	Godwin, Mary Wollstonecraft.....	262	Gortchakoff, Mikhail.....	267
Glacottis.....	262	Godwit.....	262	Gorton, Samuel.....	267
Glafre, Jean Baptiste.....	262	Goertz, Georg Henrik.....	262	Gortyna.....	267
Glamorganshire.....	262	Goes, Damião de.....	262	Goruckpoor.....	267
Gland.....	262	Goes, Hugo van der.....	262	Goshawk.....	267
Glanders.....	262	Goethe, Johann Wolfgang von.....	262	Goshen, N. Y.....	267
Glanvil, Ranulf de.....	262	Goffe, William.....	262	Goshen.....	267
Glanvill, Joseph.....	262	Goggs.....	262	Goslar.....	267
Glarus.....	262	Goffre.....	262	Gosnold, Bartholomew.....	267
Glasgow.....	262	Golconda.....	262	Gospel.....	267
Glass.....	262	Gold.....	262	Gosse, Philip Henry.....	267
Glass, Enamelled.....	262	Gold-Beating.....	262	Goszczyński, Seweryn.....	267
Glass, Soluble.....	262	Goid Coast, see Guinea.....		Gotha.....	267
Glass Paper.....	262	Gold Fish.....	262	Gotham.....	267
Glass Snake.....	262	Golden Fleece, see Argonauta.....		Gothenburg.....	267
Glassbrenner, Adolf.....	262	Golden Fleece, Order of the.....	262	Gothic Language and Literature.....	267
Glasgow.....	262	Golden Number.....	262	Goths.....	267
Glastonbury.....	262	Golden Rod.....	262	Göttingen.....	267
Glatz.....	262	Goldfinch.....	262	Gottland.....	267
Glauber, Johann Rudolf.....	262	Goldoni, Carlo.....	262	Gottschalk, Louis Moreau.....	267
Glauber's Salt.....	262	Goldschmidt, Hermann.....	262	Gottschall, Rudolf.....	267
Glee.....	262	Goldsmith, Oliver.....	262	Gottsched, Johann Christoph.....	267
Gleig, George.....	262	Golf.....	262	Gouda.....	267
Gleig, George Robert.....	262	Golgotha, see Calvary.....		Goudchaux, Michel.....	267
Glein, Johann Wilhelm Ludwig.....	262	Gollad co.....	262	Gouges, Marie Olympe, see Aubry.....	
Glencoe.....	262	Gollus, Jacobus.....	262	Gough, Hugh.....	267
Glendower, Owen.....	262	Golownin, Vasil.....	262	Gough, John B.....	267
Glentworth, George.....	262			Gough, Richard.....	267



<b>PAGE</b>	<b>PAGE</b>	<b>PAGE</b>			
Goulet, Claude Pierre.....	393	Grandenz.....	424	Greenwood, Francis William Pitt,	427
Gould, Augustus Addison, M.D.....	393	Graun, Karl Heinrich.....	424	D.D.....	427
Gould, Hannah Flagg.....	393	Grave Creek.....	424	Greenwood, Miles.....	427
Gould, James.....	394	Gravel.....	424	Grégoire, Henri.....	427
Gould, John.....	394	Gravel, a disease.....	425	Gregorian Chant.....	427
Gour.....	394	Gravel Walls.....	425	Gregorio, Rosario.....	427
Gourd.....	394	Graves co.....	425	Gregory, 16 popes.....	427
Gouraud, Gaspard.....	395	Gravesande, Willem Jacob van 's.....	425	Gregory, James.....	427
Gout.....	395	Gravesend.....	425	Gregory, David.....	427
Gouvion Saint Cyr, Laurent.....	397	Gravina, Giovanni Vincenzo.....	425	Gregory, John.....	427
Govona, Rosa.....	397	Gravity.....	427	Gregory, James.....	427
Gower, John.....	397	Gravity, Specific.....	427	Gregory, Olinthus Gilbert.....	427
Goyanna.....	398	Gray, a town.....	429	Gregory of Nyssa.....	427
Goyas.....	398	Gray, Asa.....	429	Gregory of Tours.....	427
Gozlan, Léon.....	398	Gray, Henry Peters.....	429	Gregory the Illuminator.....	427
Gral.....	398	Gray, John Edward.....	429	Gregory Nazianzen.....	427
Grabbe, Christian Dietrich.....	399	Gray, George Robert.....	429	Gregory Thaumaturgus.....	427
Gracchus, Tiberius Sempronius.....	399	Gray, Thomas.....	429	Greifswalde.....	427
Gracchus, Caius Sempronius.....	400	Graydon, Alexander.....	429	Grellet, Stephen.....	427
Graces, The.....	401	Graying.....	424	Grenada.....	427
Gracias & Dios.....	401	Grayson co., Va.....	424	Grenade.....	427
Gracias & Dios, Cape.....	401	Grayson co., Tex.....	424	Grenadier.....	427
Gravina, Johann Georg.....	401	Grayson co., Ky.....	424	Grenoble.....	427
Grife, Karl Ferdinand von.....	401	Grayson, William J.....	425	Grenville, George.....	427
Grife, Albrecht von.....	402	Graywacke.....	425	Grenville, Lord, see Wyndham,	427
Grifenberg.....	402	Great Barrington.....	425	William.....	427
Grafting, see Engrafting.....	402	Great Britain.....	425	Grenville, Richard, see Temple,	427
Grafton co.....	403	Great Kanawha.....	425	Karl.....	427
Grafton, Mass.....	403	Great Salt Lake.....	425	Grenville, Sir Richard.....	427
Graham, Isabella.....	403	Great Slave Lake.....	426	Graham, Sir Thomas.....	427
Graham, Sir James Robert George.....	403	Great Slave River.....	426	Greset, Jean Baptiste Louis.....	427
Graham, John, Viscount Dundee.....	403	Graves, John.....	426	Greta.....	427
Graham, John Andrew, LL.D.....	403	Grebe.....	426	Gretia Green.....	427
Graham, Joseph.....	403	Greece.....	427	Grétry, André Ernest Modeste.....	427
Graham, William Alexander.....	404	Greece, Language and Literature of.....	427	Gresu, Jean Baptiste.....	427
Graham, Sylvester.....	404	Greek Church.....	427	Greville, Sir Fulke.....	427
Graham Island.....	404	Greek Fire.....	427	Grew, Nehemiah.....	427
Grahame, James (two).....	405	Greeley, Horace.....	427	Grey co.....	427
Grahamstown.....	405	Green.....	427	Grey, Charles, 2d Earl.....	427
Grain.....	406	Green, Alexander L. P., D.D.....	427	Grey, Henry George, 3d Earl.....	427
Grakle.....	406	Green, Ashbel, D.D.....	427	Grey, Sir George (two).....	427
Grammar, see Language.....	406	Green, Jacob.....	427	Grey, Lady Jane.....	427
Gramme.....	407	Green, James Stephen.....	427	Greyhound.....	427
Grammont, Family of.....	407	Green, Samuel.....	427	Greytown, see San Juan de Nicara-	427
Grammont, Duke Antoine.....	407	Green Bay.....	427	gua.....	427
Grammont, Count Phillibert.....	407	Green Bay, a city.....	427	Gridley, Jeremiah.....	427
Gramplans, The.....	407	Green Gage.....	427	Grier, Robert Cooper.....	427
Grampus.....	407	Green Mountains.....	427	Griesbach, Johann Jakob.....	427
Gran.....	408	Green River.....	427	Griffin, a monster.....	427
Granada, Nicaragua.....	408	Green River co.....	427	Griffin, a city.....	427
Granada, Spain.....	408	Green Vitriol, see Copperas.....	427	Griffin, Edward Dorr, D.D.....	427
Granada, New, see New Granada.....	408	Greenbrier co.....	427	Griffin, Gerald.....	427
Granby, John Manners.....	409	Greenbush.....	427	Griffith, William.....	427
Grand Haven.....	410	Greencastle.....	427	Grijalva, Juan de.....	427
Grand Isle co.....	410	Greene co., N. Y.....	427	Grigorovitch, Nicolai.....	427
Grand Rapids.....	410	Greene co., Penn.....	427	Grillparzer, Franz.....	427
Grand River.....	410	Greene co., Va.....	427	Grimaldi, Family of.....	427
Grand Traverse.....	410	Greene co., N. C.....	427	Grimaldi, Ranieri.....	427
Graudee.....	410	Greene co., Ga.....	427	Grimaldi, Carlo.....	427
Grandpré, Louis Marie Joseph	410	Greene co., Ala.....	427	Grimaldi, Antonio.....	427
Ohler.....	410	Greene co., Miss.....	427	Grimaldi, Giovanni.....	427
Granger co.....	411	Greene co., Ark.....	427	Grimaldi, Domenico.....	427
Granger, Glendon.....	411	Greene co., Tenn.....	427	Grimaldi, Geronimo.....	427
Granicus.....	411	Greene co., Ky.....	427	Grimes co.....	427
Granier, Adolphe.....	411	Greene co., Ohio.....	427	Grimek, Thomas Smith.....	427
Granite.....	413	Greene co., Ind.....	427	Grimek, Frederic.....	427
Grant.....	413	Greene co., Ill.....	427	Grimm, Friedrich Melchior.....	427
Grant co., Ky.....	414	Greene co., Mo.....	427	Grimm, Jakob Ludwig.....	427
Grant co., Ind.....	414	Greene co., Iowa.....	427	Grimm, Wilhelm Karl.....	427
Grant co., Wis.....	414	Greene, Christopher.....	427	Grimm, Ludwig Emil.....	427
Grant, Anne.....	414	Greene, George Washington.....	427	Grindal, Edmund, D.D.....	427
Grant, Francis, R.A.....	414	Greene, Nathanael.....	427	Grindstone.....	427
Grant, James (two).....	415	Greene, Nathaniel.....	427	Grinnell Land.....	427
Grant, Robert Edmund.....	415	Greene, Charles Gordon.....	427	Griqua.....	427
Granville, Antoine Perrenot.....	415	Greene, Robert.....	427	Griscom, John, LL.D.....	427
Granville co.....	417	Greensville co.....	427	Griscom, John Hoskins.....	427
Granville.....	417	Greenfield.....	427	Griesbach, August Heinrich Radolf.....	427
Granville, George.....	417	Greenhouse.....	427	Grisl, Giulia.....	427
Granville, Granville George Leve-	417	Greenhow, Robert.....	427	Grisons.....	427
son Gower.....	417	Greenland.....	427	Griswold, Alexander Vieta, D.D.....	427
Grape.....	417	Greenleaf, Simon.....	427	Griswold, Roger.....	427
Grape Shot.....	419	Greenock.....	427	Griswold, Rufus Wilmot.....	427
Graphite.....	419	Greenough, Horatio.....	427	Grit.....	427
Graptolites.....	420	Greenport.....	427	Gritti, Andrea.....	427
Grasse.....	420	Greensand.....	427	Gritti, Luigi.....	427
Grasshopper.....	421	Greensborough.....	427	Groat.....	427
Gratian.....	422	Greensboro.....	427	Groat.....	427
Gratiot co.....	423	Greenup co.....	427	Grocyn, William.....	427
Grattan, Henry.....	423	Greenville dist.....	427	Grodno.....	427
Grattan, Thomas Colley.....	423	Greenwich, Eng.....	427	Groningen.....	427
Gratz.....	424	Greenwich, Conn.....	427	Gronovius, Family of.....	427
		Greenwich, Conn.....	427	Gronovius, John Frederic.....	427

# CONTENTS.

V

	PAGE
Gronovius, Jacobus.....	511
Gronovius, Laurentius Theophilus.....	512
Gronovius, Abraham.....	512
Gronovius, John Frederic, 2d.....	512
Gronovius, Laurentius Theophilus, 2d.....	512
Groot, Gerhard.....	512
Gros, Antoine Jean.....	512
Grosbeak.....	512
Grose, Francis.....	514
Gross, Samuel D.....	514
Gross-Beeren, see Beeren, Gross.	
Grosswarden.....	514
Grote, George.....	514
Grotefend, Georg Friedrich.....	515
Grotius, Hugo.....	515
Groton, Mass.....	517
Groton, Conn.....	517
Grotto.....	517
Gronchy, Emmanuel.....	517
Groundsel.....	518
Grouse.....	518
Grove, William Robert.....	520
Grubenagen.....	521
Gruber, Johann Gottfried.....	521
Grün, Anastasius, see Anersperg.	
Grünberg.....	521
Grundtvig, Nicolai Frederik Severin.....	521
Grundy co., Tenn.....	523
Grundy co., Ill.....	523
Grundy co., Mo.....	523
Grundy co., Iowa.....	523
Grundy, Felix.....	523
Gruener, Christian Gottfried.....	523
Gruener, Wilhelm Heinrich Ludwig.....	523
Gruener, Johann August.....	523
Grueter, Jan.....	523
Gruyère.....	523
Guacharo.....	523
Guachos.....	523
Guaco.....	524
Guadalajara, Mexico.....	524
Guadalajara, Spain.....	524
Guadalquivir.....	524
Guadalupe co.....	524
Guadeloupe.....	525
Guadet, Joseph.....	525
Guadiana.....	525
Guadix.....	525
Guahan.....	525
Guaiacum.....	525
Guailan.....	526
Guam, see Guahan.....	
Guamanga.....	526
Guam.....	526
Guancaste.....	527
Guanaiani, see San Salvador.	
Guanaia, see Bay Islands.	
Guanajuato.....	527
Guanches.....	528
Guano.....	528
Guaranty.....	531
Guard.....	534
Guardian.....	534
Guardiola, Santos.....	535
Guards.....	535
Guarda, National.....	538
Guarini, Giovanni Battista.....	539
Guatemala.....	539
Guatemala, Nueva.....	543
Guatemala, Antigua.....	543
Guatusos.....	543
Guaxaca, see Oaxaca.....	
Guayape.....	543
Guayaquil.....	544
Guayaquil, a river.....	544
Guaymas.....	544
Gudgeon, in mechanics.....	545
Gudgeon, a fish.....	545
Gudin, Jean Antoine Théodore.....	545
Quebres.....	545
Queguetenango.....	546
Quelph.....	546
Quelphs and Ghibellines.....	547
Quercino, see Barbieri.	
Quericke, Heinrich Ernst Ferdinand.....	548
Quericke, Otto von.....	548
Querrilla.....	548
Guérin, Jean Baptiste Paulin.....	549
Guérin, Pierre Narcisse.....	549

	PAGE
Guernsey.....	549
Guernsey co.....	549
Guerazzi, Francesco Domenico.....	549
Guerrero, Vicente.....	550
Guesclin, Bertrand du.....	550
Guesse, George.....	551
Guest.....	551
Guetard, Jean Etienne.....	551
Guggenbühl, Louis.....	551
Gulana.....	552
Gulana, British.....	552
Gulana, Dutch.....	552
Gulana, French.....	552
Gulbert, Jacques Antoine Hippolyte.....	552
Gulcelardini, Francesco.....	552
Gulcowar.....	554
Guidi, Tommaso, see Massacio.	
Guido, Aretino, see Aretino.	
Guido Reni.....	554
Guienne.....	555
Guignes, Joseph de.....	555
Guignes, Chrétien Louis Joseph.....	555
Gula.....	555
Guild.....	555
Guilder.....	556
Guildford.....	556
Guildford.....	556
Guildford Court House.....	556
Guillemet.....	557
Guilleminot, Armand Charles.....	558
Guillim, John.....	558
Guillotin, Joseph Ignace.....	558
Guillotine.....	558
Guinand, M.....	559
Guinea, a coin.....	559
Guinea.....	559
Guinea, Gulf of.....	560
Guinea Fowl.....	560
Guinea Pig.....	561
Guinea Worm, see Entozoa.....	
Gulpuzcoa.....	562
Gulscard, Robert.....	562
Gulschard, Karl Gottlieb.....	562
Guise, House of.....	562
Guise, François, 2d Duke of.....	562
Guise, Henri I.....	562
Guise, Henri II.....	562
Guitar.....	564
Guizot, François Pierre Guillaume.....	564
Guizot, Elisabeth Charlotte Pauline de Meulan.....	566
Guizot, Maurice Guillaume.....	566
Guzerat, see Guzerat.....	
Goldenstaedt, Johann Anton.....	566
Gulf Stream, see Atlantic Ocean.....	
Gull.....	566
Gum.....	567
Gum Arabic.....	568
Gum Tragacanth.....	568
Gum, Cherry Tree.....	568
Gum Kino.....	568
Gum Mezquite.....	569
Gum Resins.....	569
Gum Tree, see Black Gum.....	
Gumbinnen.....	569
Gunn.....	569
Gun Boat.....	574
Gun Cotton.....	574
Gun-Shot Wounds.....	575
Günderode, Karoline von.....	577
Gunduck.....	577
Gundwana.....	577
Gunnery.....	577
Gunny.....	582
Gunpowder.....	582
Gunter, Edmund.....	586
Gunter's Chain.....	586
Gunter's Line.....	586
Gunter's Quadrant.....	586
Günther, Anton.....	586
Guntoor.....	587
Gurnard.....	587
Gurnoy, Joseph John.....	588
Gurowski, Adam de.....	588
Gurwal.....	588
Gurwood, John.....	589
Gustavus I.....	590
Gustavus II.....	590
Gustavus III.....	592
Gustavus IV.....	592
Gutenberg, Johannes.....	593

	PAGE
Guthrie, James.....	596
Guthrie, Thomas, D.D.....	596
Guthrie, William.....	596
Gutierrez, Garcia.....	596
Guts-Muths, Johann Christoph Friedrich.....	596
Gutta Percha.....	597
Gutta Serena, see Amaurosa.....	
Gutta.....	600
Gutzkow, Karl Ferdinand.....	600
Gützlaff, Karl.....	601
Guy, Thomas.....	601
Guyon, Jeanne Marie Bouvier de la Motte.....	601
Guyon, Richard Debaufre.....	602
Guyot, Arnold Henry.....	602
Guyton de Morveau, Louis Bernard.....	604
Guzerat.....	604
Gwallior.....	605
Gwilt, Joseph.....	606
Gwin, William MacKendry.....	606
Gwinnett co.....	606
Gwinnett, Button.....	606
Gwynn, Eleanor.....	607
Gyges.....	607
Gylongs.....	607
Gymnasium.....	607
Gymnastics.....	608
Gymnosophists.....	611
Gymnotia, see Eel, Electrical.....	
Gynæceum.....	612
Gyöngyös.....	612
Gypsies.....	612
Gypsy Language.....	612
Gypsum.....	614
Gyrogonites.....	615
Gyroscope.....	615
Gyrowetz, Adalbert.....	619
Gyula.....	619
Gyula, Franz.....	619

## H

	PAGE
H.....	620
Haarlem.....	621
Haarlem Meer.....	622
Haas, John Philip de.....	622
Habakkuk.....	622
Habeas Corpus.....	622
Habendum.....	625
Habersham co.....	625
Habington, William.....	625
Hachette, Jean Nicolas Pierre.....	626
Hackberry.....	626
Hacket, John.....	626
Hackett, Horatio Balch.....	626
Hackett, James Henry.....	627
Hackländer, Friedrich Wilhelm.....	627
Hacmatac, see Fir.....	
Haddingtonshire.....	627
Haddock.....	627
Haddock, Norway.....	628
Hades.....	628
Hadji.....	628
Hadley, John.....	628
Hadrian.....	629
Hadrumetum.....	629
Hæmoptysis.....	629
Hæmorrhage.....	630
Hæmorrhoids.....	631
Haff.....	632
Hafiz, Mohammed.....	632
Hagar.....	632
Hagen, Friedrich Heinrich von der.....	633
Hagenbach, Karl Rudolf.....	633
Hagerstown.....	633
Haggai.....	633
Hagiographa.....	633
Hague.....	633
Hague, William, D.D.....	634
Hahn, August.....	634
Hahn, Philipp Matthäus.....	634
Hahn-Hahn, Ida Marie Luise Sophie Frederike Gustave.....	634
Hahnemann, Samuel Christian Friedrich.....	635
Hall.....	636
Halles, Lord, see Dalrymple, Sir David.....	
Hai-Nan.....	636

PAGE		PAGE		PAGE	
Hainant.....	689	Hamilton, Count Anthony.....	677	Harford co.....	723
Hair.....	689	Hamilton, Elizabeth.....	678	Hargraves, Edmund Hammond.....	723
Hair Manufactures.....	641	Hamilton, Gavin.....	678	Haring, Georg Wilhelm Heinrich.....	724
Hair Powder.....	641	Hamilton, James.....	678	Harrington, Sir John.....	724
Hake.....	641	Hamilton, Robert.....	679	Hariri, Abu Mohammed Kasem	
Hakluyt, Richard.....	643	Hamilton, William.....	679	ben Ali.....	724
Hakodadi.....	643	Hamilton, Sir William.....	679	Harlan co.....	725
Halberd.....	643	Hamilton, Emma Lyon.....	680	Harlem, see Harlem.....	
Halberstadt.....	643	Hamilton, Sir William.....	681	Harlequin.....	725
Halcyon Days.....	643	Hamilton, William Gerard.....	686	Harless, Gottlieb Christoph Adolph.....	725
Haldane, Robert.....	643	Hamilton, William Richard.....	686	Harley, Robert.....	725
Haldane, James Alexander.....	644	Hamilton, Sir William Rowan.....	686	Harlingen.....	727
Haldeman, S. S.....	644	Hamilton College.....	687	Harlow, George Henry.....	727
Hale, Benjamin, D.D.....	645	Hamlet.....	687	Harmattan.....	727
Hale, David.....	645	Hammaraköld, Lars.....	688	Harmer, Thomas.....	728
Hale, John Parker.....	645	Hammer.....	688	Harmodius, see Aristogiton.....	
Hale, Sir Matthew.....	646	Hammer-Purgstall, Joseph von.....	690	Harmonica.....	728
Hale, Nathan.....	647	Hammerich, Frederik Peder		Harmonists.....	728
Hale, Nathan, L.L.D.....	647	Adolph.....	690	Harmony.....	728
Hale, Sarah Josepha.....	648	Hammersmith.....	690	Harmonics.....	728
Hales, Alexander of, see Alexander		Hammock.....	691	Harnas, Claus.....	729
of Hales.....		Hammond, Henry.....	691	Harnett, Cornelius.....	729
Hales, Stephen.....	648	Hammond, James Hamilton.....	691	Harold I.....	729
Halévy, Jacques François Fromen-		Hammond, Le Roy.....	691	Harold II.....	729
tal Elie.....	648	Hammond, Samuel.....	692	Haroun.....	729
Halford, Sir Henry.....	649	Hampden co.....	692	Harp.....	729
Haliburton, Thomas Chandler.....	649	Hampden, John.....	692	Harper, James.....	729
Halbut.....	649	Hampden Sidney College.....	698	Harper, John.....	729
Halcarناسus.....	649	Hampshire co., Mass.....	698	Harper, Joseph Wesley.....	729
Halfax co., Va.....	651	Hampshire co., Va.....	694	Harper, Fletcher.....	729
Halfax co., N. C.....	652	Hampshire.....	694	Harper, Robert Goodloe.....	729
Halfax co., N. S.....	652	Hampton.....	694	Harper, William.....	729
Halfax, N. S.....	652	Hampton, Wade.....	694	Harper's Ferry.....	729
Halfax, England.....	653	Hamster.....	695	Harples.....	729
Halfax, Earl of, see Montague,		Hanau.....	695	Harpocrates.....	729
Charles.....		Hancock co., Me.....	695	Harpocraton, Valerius.....	729
Halfax, Marquis of, see Saville,		Hancock co., Va.....	695	Harpoon.....	729
George.....		Hancock co., Ga.....	695	Harpsichord.....	729
Hahotides.....	658	Hancock co., Ala.....	696	Harpy, in mythology, see Harpies.....	
Hall co.....	658	Hancock co., Miss.....	696	Harpy, a bird.....	729
Hall, Basil.....	658	Hancock co., Tenn.....	696	Harquebuse, see Arquebuse.....	
Hall, Dominick Augustine.....	658	Hancock co., Ky.....	696	Harrier, a hound.....	729
Hall, Gordon.....	654	Hancock co., Ohio.....	696	Harrier, a hawk.....	729
Hall, James.....	654	Hancock co., Ind.....	696	Harring, Harro Paul.....	729
Hall, John E.....	655	Hancock co., Ill.....	696	Harrington, James.....	729
Hall, James.....	655	Hancock co., Iowa.....	696	Harriot, Thomas.....	729
Hall, Joseph.....	656	Hancock, John.....	696	Harris co., Ga.....	729
Hall, Lyman.....	656	Handel, Georg Friedrich.....	697	Harris co., Tex.....	729
Hall, Marshall.....	656	Hang-Chow-Foo.....	702	Harris, James.....	729
Hall, Robert.....	656	Hanka, Wenceslaw.....	702	Harris, John, D.D.....	729
Hall, Robert Pleasant.....	658	Hanke, Henriette Wilhelmine.....	702	Harris, Thaddeus William, M.D.....	729
Hall, Samuel Carter.....	658	Hannay, James.....	702	Harris, William, D.D.....	729
Hall, Anna Maria.....	658	Hannibal, Mo.....	702	Harrisburg.....	729
Hall, Samuel Read.....	658	Hanno.....	702	Harrison co., Va.....	729
Hallam, Henry.....	659	Hanno the Great.....	702	Harrison co., Miss.....	729
Hallam, Arthur Henry.....	660	Hanover co.....	702	Harrison co., Tex.....	729
Halle.....	661	Hanover, N. H.....	702	Harrison co., Ky.....	729
Halleck, Fitz-Greene.....	661	Hanover, Kingdom of.....	702	Harrison co., Ohio.....	729
Haller, Albrecht von.....	663	Hanover.....	702	Harrison co., Mo.....	729
Haller, Karl Ludwig von.....	663	Hanseatic League.....	702	Harrison co., Iowa.....	729
Halley, Edmund, L.L.D.....	663	Hansen, Moritz Christopher.....	710	Harrison, Benjamin.....	729
Hallwell, James Orchard.....	664	Hansen, Peter Andreas.....	710	Harrison, John.....	729
Hallock, Jeremiah.....	664	Hansteen, Christopher.....	710	Harrison, William Henry.....	729
Hallock, Moses.....	664	Hanway, Jonas.....	711	Harrodsburg.....	729
Hallock, Gerard.....	664	Hapsburg.....	711	Harrow-on-the-Hill.....	729
Hallow Eve, see All-Hallows.....		Harar.....	719	Hart co., Ga.....	729
Hallowell.....	665	Harbaugh, Henry.....	719	Hart co., Ky.....	729
Halos.....	665	Harby, Isaac.....	718	Hart, John.....	729
Halyburton, Thomas.....	667	Hardeman co.....	718	Hart, Solomon Alexander.....	729
Haly.....	667	Hardenberg, Friedrich von.....	718	Hart, William.....	729
Ham, a town.....	667	Hardenberg, Karl August von.....	718	Hart, James M.....	729
Ham, son of Noah.....	667	Hardcanute.....	714	Harte, Walter.....	729
Hamadan.....	667	Hardin co., Tenn.....	714	Hartford co.....	729
Hamadryade.....	668	Hardin co., Ky.....	714	Hartford.....	729
Hamah.....	668	Hardin co., Ohio.....	714	Hartford Convention.....	729
Haman.....	668	Hardin co., Ill.....	714	Hartlepool.....	729
Hamann, Johann Georg.....	668	Hardin co., Iowa.....	714	Hartley, David (two).....	729
Hambach.....	668	Harding, Chester.....	714	Hartmann, Moritz.....	729
Hamburg.....	668	Harding, James Duffield.....	715	Hartshorn, Spirits of, see Ammonia.....	
Hamelin, Ferdinand Alphonse.....	670	Hardings, Henry, Viscount.....	715	Hartsoeker, Nicolaas.....	729
Hamlicar Barca.....	670	Hardness.....	716	Hartz.....	729
Hamilton co., N. Y.....	671	Hardouin, Jean.....	716	Harvard, John.....	729
Hamilton co., Fla.....	671	Hardwick, Charles.....	717	Harvard College.....	729
Hamilton co., Tenn.....	671	Hardwicke, Philip Yorke.....	717	Harvest Fly.....	729
Hamilton co., Ohio.....	671	Hardy co.....	717	Harvey, George.....	729
Hamilton co., Ind.....	671	Hare.....	717	Harvey, William.....	729
Hamilton co., Ill.....	671	Hare, Julius Charles.....	719	Harwood, Edward.....	729
Hamilton, N. Y.....	671	Hare, Augustus William.....	720	Hadrubal.....	729
Hamilton, Ohio.....	671	Hare, Robert.....	720	Hae, Charles Benoit.....	729
Hamilton, C. W.....	672	Hare Lip.....	721	Hae, Karl August.....	729
Hamilton, Scotland.....	672	Harem.....	721		
Hamilton, Alexander.....	672				

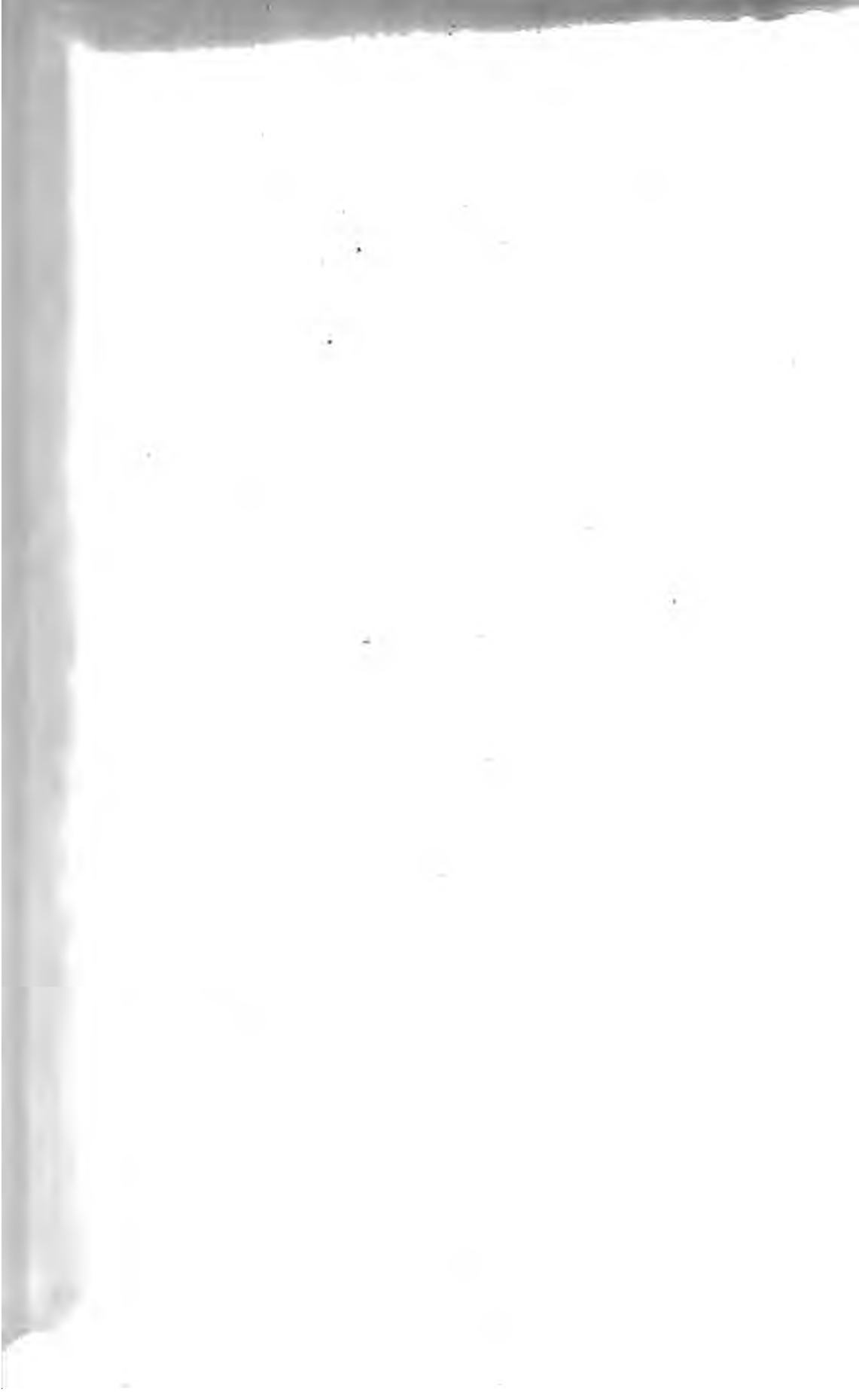
# CONTENTS.

vii

	PAGE		PAGE		PAGE
Haseenclever, Johann Peter.....	756	Haupt, Moritz.....	765	Hawaii, see Sandwich Islands.....	
Haseenclever, Peter.....	756	Hauser, Kaspar.....	765	Hawes, Joel, D.D.....	774
Hashish, see Hemp.....		Häusser, Ludwig.....	766	Hawfinch.....	774
Hassam, John.....	756	Haussonville, Charles Othenin Bar-		Hawk.....	774
Hassan ben Saba, see Batenites.....		nard de Cléron.....	766	Hawk Moth.....	775
Hasse, Friedrich Christian August.....	756	Haut-Ehin.....	767	Hawke, Edward.....	776
Hasse, Friedrich Rudolf.....	756	Hautboy.....	767	Hawkesworth, John.....	777
Hasse, Karl Ewald.....	756	Haute-Garonne.....	767	Hawking, see Falconry.....	
Hasse, Johann Adolf.....	756	Haute-Loire.....	767	Hawkins co.....	777
Hassel, Johann Georg Heinrich.....	757	Haute-Marne.....	767	Hawkins, Sir John.....	777
Hasselquist, Fredrik.....	757	Haute-Saône.....	767	Hawkins, Sir John.....	778
Hasselt.....	757	Haute-Vienne.....	768	Hawks, Francis Lister, D.D., LL.D.....	778
Hassenpflug, Hans Daniel Ludwig.....		Hautes-Alpes, see Alps, Hautes.....		Hawksmoor, Nicholas.....	770
Friedrich.....	757	Hautes-Pyrénées.....	768	Hawkwood, Sir John, see Acuto,	
Hasekari, Justus Karl.....	757	Haly, René Just.....	768	Giovanni.....	
Hassler, Ferdinand E., see Coast		Haly, Valentin.....	769	Hawley.....	779
Survey.....		Havana.....	769	Hawley, Gideon.....	779
Hastings, England.....	757	Havelock, Henry.....	771	Hawley, Joseph.....	779
Hastings, a Viking.....	758	Haven, Alice Bradley.....	779	Hawthorn, see Thorn.....	
Hastings, Francis Rawdon Hastings.....	758	Haven, Erasmus Otis, D.D.....	779	Hawthorne, Nathaniel.....	779
Hastings, Warren.....	759	Haven, Nathaniel Appleton.....	779	Hay, David Ramsay.....	781
Hat.....	760	Havercamp, Sigebert.....	779	Haydn, Joseph.....	781
Hatteras, see Cape Hatteras.....		Haverford College.....	779	Haydn, Michael.....	786
Hatti Sherif.....	764	Haverhill.....	779	Haydon, Benjamin Robert.....	786
Hauch, Johannes Carsten von.....	764	Haviland, John.....	778	Hayes, Augustus Allen, M.D.....	787
Hauff, Wilhelm.....	765	Havre.....	778	Hayley, William.....	787
Haughton, William.....	765	Havre de Grace.....	774	Haynau, Julius Jakob von.....	787
Hauksbee, Francis.....	765				









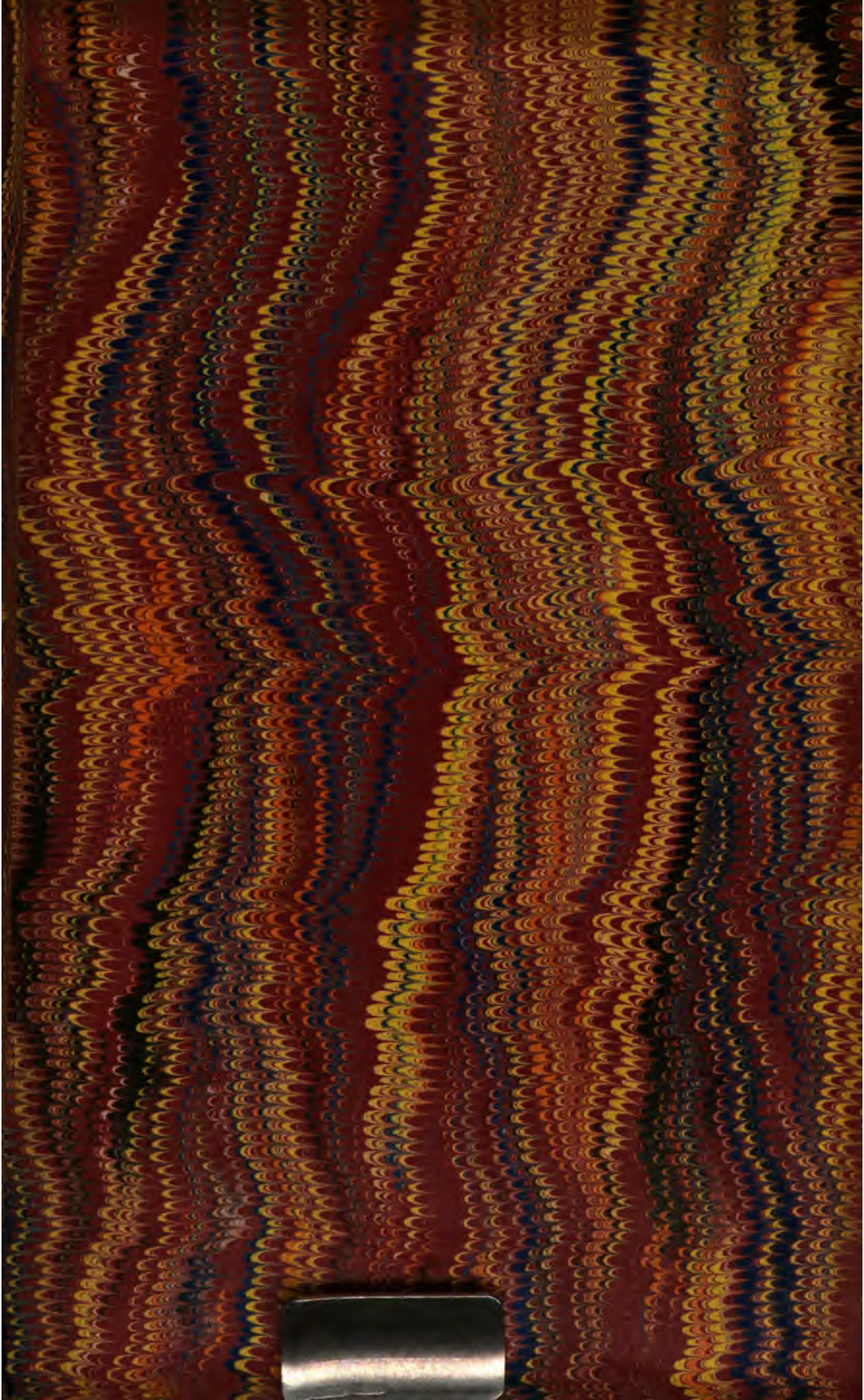


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